THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, COPPER AND BRASS, THE BRASS FOUNDER AND FINISHER AND
ELECTRO-PLATERS REVIEW

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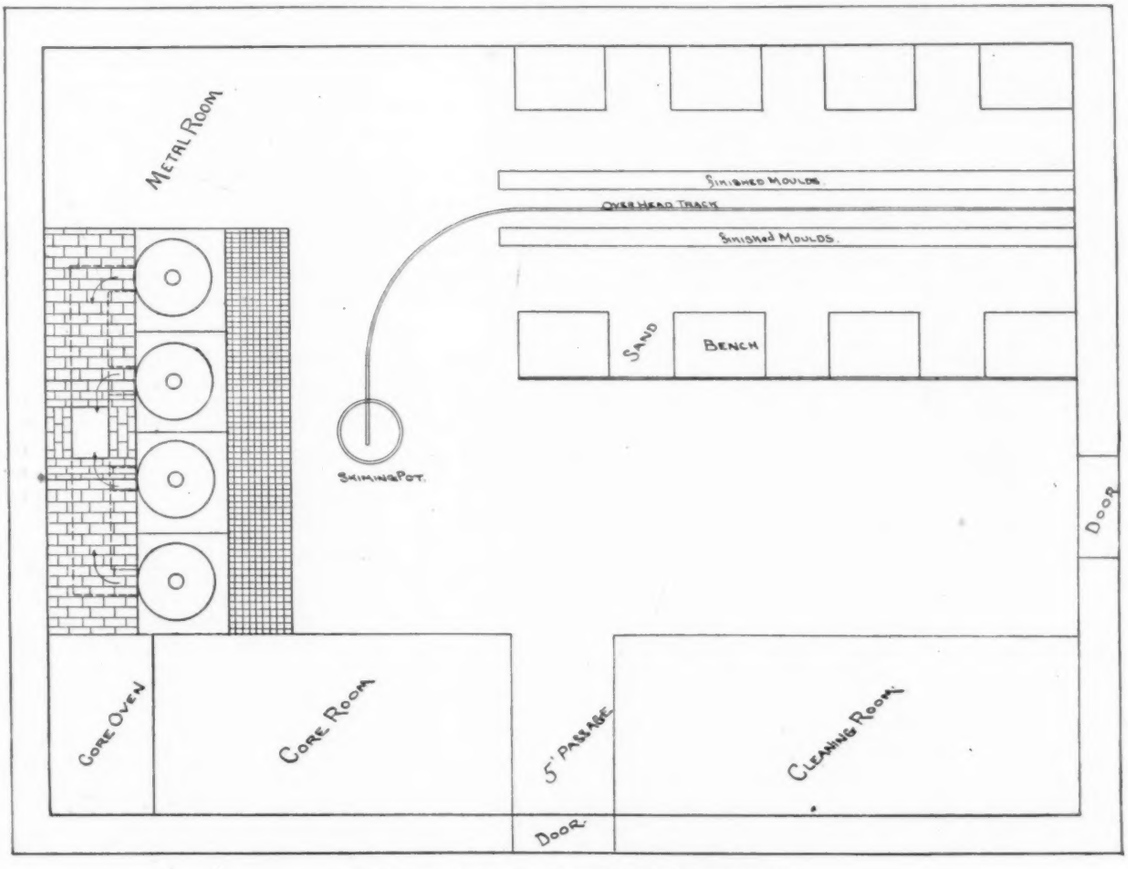
# BRASS FOUNDRY EQUIPMENT

SOME PRACTICAL INFORMATION BY A PRACTICAL MAN.

BY HUGH MCPHEE.*

The equipment for a small brass foundry must be such as to allow the work that is to be done therein to be produced in as simple and effective a manner as possible. The first consideration must be given to the furnace, which must be so constructed as to get out hot metal quickly to supply the molds, and keep the molder supplied with material to do his work without delay. A natural draft furnace constructed on the plan herein mentioned will give the desired results.

The pit recommended to be built should hold four No. 50 crucible furnaces. The size of pit for such purpose must be 9 feet long, 6 feet wide, and 5 feet, 8 inches deep, with an 8 inch concrete wall. Two 8 inch I-beams, 11 feet long, running the full length of pit and giving a bearing of twelve inches on the concrete walls at each end are recommended. The I-beams will hold the four crucible furnaces securely. The first I-beam is put close to wall of pit about 22 inches from the bottom of pit floor. The second I-beam is placed in line with first I-beam with 22 inch clearings in center of I-beams. The bottom and top furnace plate is 26 x 26 x 1 inch, with a 20 inch hole in center of plate, with two lugs cast on back of the 20 inch hole, so as to allow the grate to swing.




FLOOR PLAN FOR A MODEL BRASS FOUNDRY.

Each corner of the top and bottom plate, on the side

*Foreman, Brass Foundries, Pratt and Cady Company, Hartford, Conn.

that has no lugs, will have one eye bolt ¾ inch round iron, threaded on one end. A hole 2½ x 2 inches will allow the bolt to be passed through on each corner of furnace plate. The drum to fit the bottom plate must be 25½ x 30 x 3-16 iron, well riveted, placed on center of bottom plate; the 20 inch hole in furnace plate is the guide to line the furnace.

In lining these furnaces, place the bottom furnace plate on the I-beams, so as to get the 22 inch clearance in the center of I-beam. Place the drum on center of plate, and use the best arch silica fire brick that is adapted for furnace work. For the first course of fire brick around the 20 inch hole, get good fire clay and fire sand, and mix equal parts to a fair thickness, so that it will run back of the fire bricks and fill up all crevices. It is very essential in lining the furnaces to make them air tight. Coming to the last course, there is a 6½ inch hole cut in the drum 3 inches from the top so as to let in a 6 inch diameter wrought or cast iron pipe that must be 12 inches long and that is placed through a 6½ inch hole running from the furnace to chimney flue. The last course of fire brick is now laid to top of drum, using plenty of fire sand and clay to make good body.

Place the top plate, which must have eye bolts the same as on bottom plates, on furnace. There are eight rods connected by four return buckles made of ¾-inch round iron, with one hook on each end to hold top and bottom furnace plates, allowing the plates to be firmly screwed down and to be left in this condition for three hours' time. Before lighting furnace, unscrew return buckles, which should be left loose, and then start a moderate fire to work for two hours; after which, place crucible in furnace on 8 inches of coal on bottom, and then pile coal all around within 3 inches of top of crucible.

The furnace flue running back of the furnaces to chimney should be 8 x 10 inches, made of the same fire brick and fire sand as is used for lining the furnaces. Fourteen inch flat fire bricks are used for covering the flue, which must be air tight, the same as the furnaces. The dimensions of the chimney to be built are 16 x 16 feet. The chimney should have 8 inch brick walls running to about 6 feet in height. Fire brick should be used for lining for about 4 feet. A cast iron cap to fit brick work with a 16 inch hole in center and having a 1½ inch lip all around 16 inch hole is used. This will hold an iron pipe in center of a 30 feet chimney, which will give a good draft, if there are no buildings to interfere; guy wires can be used to brace the stack.

In front of the furnaces, an open grate work should extend for the full length. The grate work should be made in 4-foot lengths, so as to be readily removed to get at the ash pit. The furnace outfit should consist of the following:

12 No. 50 Crucibles.
1 pair crucible tongs to fit.
1 pouring shank to fit the crucibles.
1 bail to fit shank.
1 furnace chipping bar.
2 crucible tong rings, made of ½ inch round iron, with 3 inch hole.
2 pair pick-up tongs for furnaces, also 1 I-beam trolley, running to the moulders' floor to carry all metals and used in pouring.

The best size of iron flasks used in foundries today is the 12 x 16 x 3½ cope x 3 inch nowel for general work. About 80 of these flasks and 80 bottom boards, with 6 mould boards are required. There are to be no pouring holes in the end of flasks. The weight of flasks should be 80 lbs. for the 12 x 16 size, having one pouring place on end and one on side. This makes a very handy weight. There will also be required:

1 emery wheel, 18 x 2½ inches.
1 tumbling barrel.
1 machine for cutting castings off gates.
1 filing bench, 2 feet 8 inches high, and 10 feet long, having in addition 2 vises.
1 5 H.P. motor will run this plant.
1 core oven, 6 x 4 x 5 feet, made of galvanized iron, with fire box in bottom.
6 No. 8 riddles.
2 No. 4 "
2 No. 2 "
6 pair bench rammers.
4 pair bellows.
6 ingot moulds for surplus metal.

Two of the best moulding sands are No. 0 and No. 1 Albany, for making fine bronze castings, that is for general work.

For making finer work of bronze castings, such as chandelier or false core work, Windsor Locks and French moulding sand are considered the best sands.

## GERMAN DETINNING METHODS.

[United States Consul General Robert P. Skinner, Berlin.]

The recovery of tin from tin-plate waste has recently gained great importance. There are three general methods of separation—mechanical, chemical, and electrolytic. Blücher states that in the mechanical process, which incidentally has produced only poor results, the tin is melted or thrown off during heating.

In chemical separation, the tin-plate waste is treated at a low temperature with diluted hydrochloric-acid, nitric-acid, or sulphuric-acid solutions and the dissolved tin drops out with the zinc. Other dissolving agencies have been experimented on with varying success.

### ELECTROLYTIC METHODS.

Much more important than either the mechanical or the chemical process is the electrolytic method of detinning. As a rule, hot caustic soda (liquid) is employed as electrolyte (6 to 7 per cent. $Na_2O$). Loosened chips of tin plate packed in wire baskets act as anodes, while the iron bath walls or iron plates suspended therein serve as cathodes. The average tension is said to be 1.5 volts. When separated, the tin is spongiform.

In other processes acid electrolytes are employed. Thus in the older Siemens & Halske process chips of tin plate packed in wood-latticed baskets serve as anodes, the cathodes consisting of tinned copper. The electrolyte is made up of a solution of 1 volume of 60 per cent. sulphuric acid and 9 volumes of water. The density of the current is about 100 amperes to the square meter (10.764 square feet).

Recently Siemens & Halske have also been employing an alkaline electrolyte that offers great advantages over the acid electrolytes formerly used. At any rate, it may be safely stated that the electrolytic methods utilizing acid and ferrosulphate electrolytes have not been shown to possess any practical value.

### CHLORIDE METHOD.

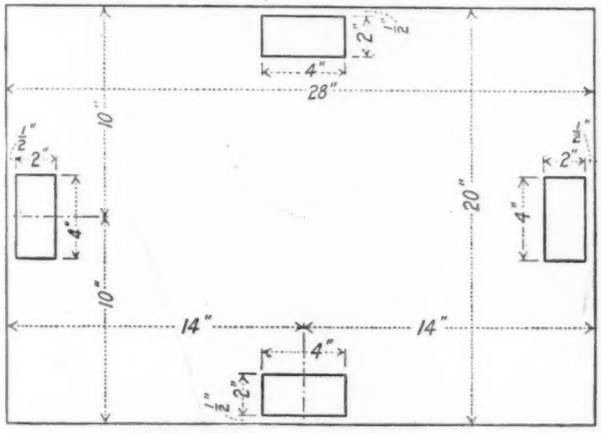
By far the greatest amount of tin-plate waste is now being detinned by the chloride method that Lambotte, of Brussels, was the first to apply on a large scale. (Imperial German letters patent No. 32517.) The principal requirements for a successful application of this method are absolute exclusion of moisture during the process of detinning, avoidance of an unduly high temperature, and proper washing of the detinned waste.

# METHOD OF SAMPLING AND ANALYSIS OF TIN, TERNE AND LEAD-COATED SHEETS*

By J. A. Aupperle.

In response to inquiries to the manufacturers and consumers of tin, terne and lead-coated sheets, we received information which showed there was no uniformity in the method of sampling of these materials, nor in the amount taken for analysis. As regards chemical analysis, we found that about 90 per cent. of the replies received described the method which will be referred to hereafter as the "proposed method."

Tin, terne and lead-coated sheets invariably contain a ridge of heavy metal at one edge, due to the flow of metal after the sheets are coated. The manufacturer ordinarily bases the weight of coating upon the weight of a box of black sheets, and the weight of the same sheets after coating. The consumer is not interested in the amount of heavy metal on certain portions of the sheet known as "list edge"; that in which he is interested is the average weight of coating. Consequently, when an analysis is made disregarding the




SHOWING HOW THE SHEET IS SAMPLED.

"list," a difference of several pounds per box may be found between the amount of metal the manufacturer puts on the sheet and the amount found by chemical analysis.

In order to standardize the methods of sampling, it is desirable to disregard the "list edge," and to take a sample which fairly represents the average of the sheet. From investigations which we have conducted, we believe that samples from near the four edges of the sheet accurately represent the average coating. We therefore propose the following method of sampling and methods of analysis:

## PROPOSED METHOD OF SAMPLING AND ANALYSIS OF TIN, TERNE AND LEAD-COATED SHEETS.

### METHOD OF SAMPLING.

Four 2 by 4-in. pieces are cut, one from each end and each side of the sheet, parallel with the sides and equidistant from the ends, as shown in Fig. 1. One sheet from each grade or shipment is taken for analysis.

These samples, before weighing, should be thoroughly cleaned with chloroform, carbon tetrachloride or gasoline. Each piece is then cut in half, marking one half "A" and the other half "B." The four pieces comprising lot A are then accurately weighed together, cut into small pieces about 1/8 in. square, thoroughly mixed, and used for the determination of tin and lead. The four pieces comprising lot B are reserved for the analysis of base metal and the direct determination of coating as a check on the analysis of lot A.

A templet should be provided, made preferably from steel 1/8 in. thick and exactly 2 by 4 in. The templet is then used to subdivide the 2 by 4-in. specimens into two pieces, 2 by 2 in. The sections for analysis are then cut with tinners shears.

### DETERMINATION OF TIN.

Three 5-g portions of the finely cut sample of lot A are placed into three 300-cc. Erlenmeyer flasks, each fitted with a one-hole rubber stopper containing a glass tube bent twice at right angles, one end of which projects through the rubber stopper for a short distance, the other end being long enough to reach almost to the bottom of a beaker, placed on a level with the flask, containing about 300 cc. of dilute sodium-bicarbonate solution. Add 75 cc. of concentrated hydrochloric acid, connect the flask with the stopper containing the glass tube, and place the flask on a hot-plate. Heat gradually at first until most of the metal is in solution. The long end of the glass tube, in the meantime, is submerged in the beaker. The hydrochloric-acid solution is finally brought to boiling and when all the metal is dissolved the beaker containing dilute sodium-bicarbonate solution is replaced by one containing a saturated solution of the same. Remove the beaker and flask to a cool place. This will cause a small amount of the sodium bicarbonate to enter the flask and exclude the air. The solution is finally brought to a low temperature, preferably with ice water. This solution is then diluted to about 200 cc. with oxygen-free water which contains several cubic centimeters of starch solution, and titrated with N/20 iodine solution. We have found this strength of iodine solution to be the most satisfactory for this method.

The distilled water free from oxygen is obtained in any of three ways: (1) By passing carbon dioxide through the cold distilled water; (2) by boiling vigorously and cooling; or (3) by adding a few cubic centimeters of concentrated hydrochloric acid to the water and then about 2 g. of sodium bicarbonate, stirring vigorously. By running this determination in triplicate, the first titration serves as a control to indicate the number of cubic centimeters of iodine required, whence the two succeeding titrations may be made very rapidly and should check very closely.

Standardizing the Iodine Solution.—About 0.1 g. of pure tin and 4 g. of iron filings are dissolved in 75 cc. of concentrated hydrochloric acid, etc., as under the determination of tin. One cubic centimeter of N/20 iodine = 0.002975 g. of tin.

Calculation.—Weight of tin:

$$\frac{\text{Wt. of tin on 5 g.} \times \text{Wt. (g.) of 16 sq. in.}}{5} \times 8.6421 = \text{number of pounds per case of 112 sheets, 20 by 28 in.}$$

### DETERMINATION OF LEAD.

Dissolve 10 g. of the finely cut sample of lot A in 150 cc. of nitric acid (1:1). Heat until free from

*Paper read at meeting of American Society for Testing Materials, Atlantic City, N. J., June 30-July 3, 1914.

brown fumes and dilute to 1 liter and mix thoroughly. Take 100 cc. of this solution, add 10 cc. of concentrated nitric acid, electrolyze at a temperature of 50 to 60 degs C., using 1 to 2 amperes and 2.3 to 2.5 volts. The weight of $PbO_2$ is multiplied by 0.866.

Calculation.—Weight of lead:

$$\frac{PbO_2 \text{ found (g.)} \times 0.866 \times 10 = Pb;\ Pb \times \text{Wt. (g.) of 16 sq. in.}}{10} \times 8.6421 =$$

number of pounds per case of 112 sheets, 20 by 28 in.

DIRECT DETERMINATION OF THE WEIGHT OF COATING.

The remaining four pieces representing lot B are used for the analysis of the base metal and incidentally can be used for the direct determination of the weight of coating.

The four 2 by 2-in. pieces are carefully weighed together and each piece is wrapped with a stiff platinum or nickel wire in such a manner that it may be placed in the acid in a horizontal position. Heat 60 cc. of concentrated sulphuric acid contained in a 400-cc. Jena glass beaker to at least 250 degs. C., immerse each piece separately in the hot acid for exactly 1 minute, and remove to a 600-cc. Jena beaker containing 50 cc. of distilled water. Immerse momentarily and rub the surface while washing with about 50 cc. more of distilled water, using a wash bottle for this purpose. The four samples are thoroughly dried, reweighed, and used for the analysis of base metal.[1]

The loss in weight represents the coating and some iron. The sulphuric acid contained in the 400 cc. beaker is cooled and combined with the washings in the 600 cc. beaker. Two hundred cubic centimeters of concentrated hydrochloric acid are added and the solution boiled for a few minutes. The solution is cooled, poured into a graduated 500 cc. flask and filled to the mark with distilled water.

Determination of Iron.—Place 100 cc. of this solution in a 300-cc. Erlenmeyer flask, add 1 cc. of a saturated solution of potassium permanganate to oxidize the iron and tin, heat to boiling and reduce with a few drops of stannous chloride. Cool, pour into a liter beaker containing 400 cc. of distilled water, add 25 cc. of mercuric chloride, followed by 10 cc. of phosphoric acid and manganese-sulphate solution, and titrate with N/10 potassium permanganate.

Calculation.—

| | |
|---|---|
| Four pieces 2 by 2 in. weigh | 28.5686 g. |
| Same after stripped in acid | 24.1620 " |
| Loss, coating plus iron | 4.4066 " |
| Iron as found by titration | 0.4887 " |
| Weight of coating | 3.9179 " |

3.9179 × 8.6421 = number of pounds per case of 112 sheets, 20 by 28 in.

$$\frac{\text{Tin in 100 cc.} \times 5 \times 100}{\text{Weight of Coating}} = \text{percentage of tin.}$$

$$\frac{PbO_2 \text{ (in 100 cc.)} \times 0.866 \times 10 \times 100}{\text{Weight of Coating.}} = \text{percentage of lead.}$$

In the analysis of tin plate, the weight of coating is expressed in pounds per box, which is a half case, or 112 sheets 14 by 20 in.; hence to obtain the weight of coating per box on tin plate, the number of pounds as obtained above is divided by two.

Check Determination of Tin.—The remainder of the solution which has been used for the determination of iron can be used for the determination of tin as follows: Place three portions of 100 cc. each in three 300-cc. Erlenmeyer flasks. If any of the lead sulphate should or should not be removed in any of these portions, the accuracy of the tin determination is not affected. Add 1 g. of powdered antimony, connect with rubber stopper and glass tube described in the method of determination of tin in the sample lot A, place on a hot-plate, using dilute sodium-bicarbonate solution as a trap, and heat until the solution becomes decolorized. Replace the dilute sodium-bicarbonate solution with a saturated solution of the same, remove from the hot-plate, cool, dilute and complete the determination as described under the first method.

[1] The methods of analysis of the base metal are outside the scope of this paper and will not be given.

CONCLUSIONS.

We claim for this method that the sample shows a true average of the coating on the plate, since we have checked the coating very closely by this method and by sampling from the center of the sheet, even with such large samples as 10 by 10 in. When 5 g. of the sample are taken for the determination of tin, an area of about 2.5 sq. in. is represented in the case of 40-lb. IC plate, and of about 3 sq. in. in the case of 25-lb. plate; while, of course, it is double this in the determination of lead. Furthermore, the amount of sample taken here for analysis is a representative quantity from 16 sq. in. and not merely from one particular section of 2.5 or 3 sq. in.; and is as large as many laboratories are using and larger than most are using.

In addition, we believe that this method is more truly average than any method we have investigated, and moreover, the sheet is not destroyed so far as usefulness is concerned, but may be sheared down to a smaller size. While it is not necessary to determine the weight of coating directly by the sulphuric acid method, in addition to the determination of the lead and tin (on lot A), it will, however, serve as a check, and should agree very closely with it. Furthermore, this is an excellent method for stripping the coating preliminary to the analysis of the base metal.

By running the determination of tin in triplicate, as described, the method is very rapid and accurate, whereas the method as now used by many laboratories in which the plate is dissolved in an atmosphere of carbon dioxide in a graduated flask, cooled, diluted to volume and titrated in aliquots, involves many details and is not so rapid. In this method also, no antimony is needed for the reduction of tin, since the iron in the base metal accomplishes this; moreover, in the presence of the quantity of tin here involved the antimony would have a tendency to deposit back on the plate, retarding the solution of the tin and thus giving low results.

With the use of a rotating anode the proposed method is very rapid and the entire determination can be finished in a reasonable length of time.

## ALUMINUM EXPORTS.

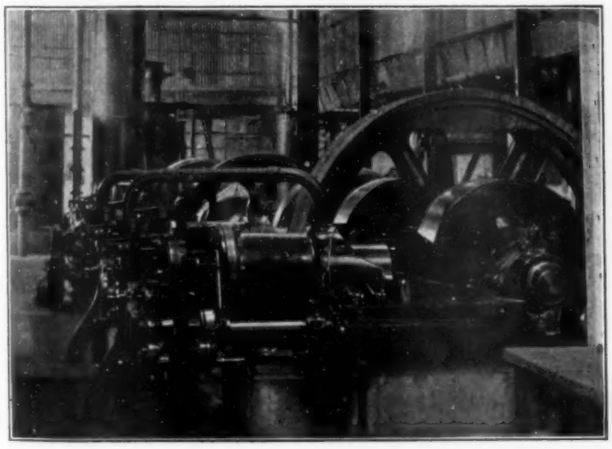
Although there was a decline in the value of aluminum exports in Switzerland, in 1913, the general condition of this industry appears to be excellent. The plants are to be extended and new bauxite works in connection with one of the Swiss plants are to be built near Cologne, Germany, which will be put into operation in 1914. One company reports an annual production of 26,000,000 pounds of aluminum, as compared with 7,044 pounds when it started in 1889.

# THE INDIAN ALUMINUM COMPANY, LIMITED, MADRAS

A Brief Description of a Far East Manufacturing Company.

In 1898 the working of aluminum was introduced into India in the metal work department of the Madras School of Arts and in 1900 The Indian Aluminum Company was started by Mr. Eardley Norton, then practicing as a barrister in Madras, and Mr. Hawkins, the present General Manager of the company, with a view to following up and developing the pioneer work undertaken by the Madras Government. For a time the company and the aluminum department worked in conjunction to open up a market in India and with such success that in 1903 it was considered that the time had arrived when private enterprise could be left to carry on the business unaided and this opinion was endorsed by the directors of The Indian Aluminum Company, who entered into an agreement with the Madras Government to take over the whole business developed at the School of Arts. The nominal capital of the company was increased to $350,000 and a sufficient number of shares were subscribed to finance the transfer and provide for further developments. The first workshops of the company soon proved inadequate and some time before the transfer the site now occupied by the existing factory was acquired. In the early days of aluminum working in Madras very little machinery was used and the number of skilled metal workers who found employment was large, but it was soon found that the primitive methods of the hand workers were inadequate and gradually machine processes of working were introduced till at the present time the workshops of the company are probably as complete as any in the world in regard to their equipment. The motive power is supplied by three large gas engines working on suction gas

VIEW IN SPINNING DEPARTMENT AT THE PLANT OF THE INDIAN ALUMINUM COMPANY.



THE POWER HOUSE. 122-H.P. GAS ENGINE IN FOREGROUND. GAS PRODUCER IN BACKGROUND.

A TWO-PIECE ALUMINUM WATER BOTTLE. HOLDS 3 PINTS AND WEIGHS 11 OUNCES.

and the energy is distributed to the various branches of the factory by electricity. The bulk of the work turned out by the company is accomplished by drawing and spinning processes, but no insignificant amount of hand work is still done and probably in this factory to a greater degree than anywhere else may be found the old craftsman working alongside and in collaboration with modern machine processes. At first the market for aluminum goods in India was mainly confined to Europeans and the native troops. It was only very slowly that the new metal found its way into the bazaar, but that it has finally done so there is evidence in the fact that the imports of raw metal into India were valued last year at over $850,000. Its advantages and its limitations are now well known, prejudice against its use is gradually weakening and there is little doubt that it has found a permanent sphere of utility in meeting some of the domestic requirements of the people of India. So far no attempt has been made to manufacture the raw metal in India and it is doubtful if ever the conditions essential to success will be realized, and the company is still dependent on Europe for both sheet and Ingot metal. It is however conveniently situated in Madras to develop business in the Farther East, and the exports of aluminum hollow ware from Madras are steadily increasing both in volume and value. The enterprise of the directors has met with deserved success; as evidence of which it may be mentioned that the average dividend of the last six years has been 12 2/3 per cent. The compny has been in existence 15 years; the turnover for the first five years was $225,000, for the second five years, $600,000, and for the last five years, $750,000.

A SEAMLESS ALUMINUM WATER BOTTLE. NEARLY A QUARTER OF A MILLION HAVE BEEN MADE. HOLDS 3 PINTS AND WEIGHS 11 OUNCES.

## THE SPOTTING OUT PROBLEM

ANOTHER SUGGESTION FOR THE SOLVING OF THIS ANNOYING QUESTION.

BY F. J. CORNER.

As I am a chemist, the problems on spotting out which have frequently appeared among the pages of THE METAL INDUSTRY have been very interesting to me. Investigators have diligently sought remedies by means of which to overcome this vexatious problem, and the one which appeared in the July, 1914, number, by Charles H. Proctor, has its merits. But, as it therein appears, it can hardly be classed as one of the practical solutions of the problem, for the main reason that too many manipulations are necessary entailing either a larger plant and more apparatus, which means added cost, or the lengthening of the time and consequently the reduction of the number of pieces, in the same length of time.

My remarks are nothing personal, but only made to show that manufacturers in general are loathe to spend money for plant additions unless some merit can be shown for such additions. As before stated, though, Mr. Proctor's scheme has its merits and no doubt could be reduced to a practical basis, as far as manipulations are concerned. Attacking the problem from a purely chemical basis, it would seem that a better solution would be in the way of a neutral salt, which would be soluble in water and which would chemically react with the objectionable ingredient which causes spotting out. I do not profess a solution of this problem, but, by way of suggestions, will endeavor to make my point more clear.

As I understand it, the chemical salt which is left in the pores and which causes spotting out, is neither the compounds of potassium or sodium cyanides or silver cyanides, but the more complex one of potassium- or sodium-silver cyanide. It is well known that alkalies in general do not destroy cyanides, and the only alternative, therefore, are acids or neutral acid salts. The objections to strictly acid solutions, however weak they may be, is their corrosive action upon the deposit and ultimate destroying of it. In that case only one chemical solution is left, viz.: neutral acid salts. There are many such reagents that may be used, but the ones which seem the most promising are those which will actively combine with the cyanogen radical, so as to produce a white salt, and by so doing, neutralize the objectionable cyanide. One of the reagents which might be used for this and which is comparatively cheap is lead nitrate. This salt is soluble in water and as the percentage of soluble, double silver cyanide; which is left in the pores of the metal, is extremely small, I would recommend two to four ounces per gallon of water.

This reagent reacts with the cyanogen radical referred to above, producing lead cyanide. Or it may be stated this way: "The acid radical of lead nitrate $(NO_3)_2$ reacts with the cyanogen radical of the double cyanide and thereby neutralizes it, a chemical cyanogen salt of lead being formed." What effect this new product, lead cyanide or double cyanide, will have upon the final spotting out, can only be guessed at until a practical trial of it has been made. It must be noted that should this prove effective, only one more process is required.

As a plan to effectively carry this out, but by no means the final word for such, I should say that after the articles are plated and have been washed as usual, they then be dipped into a hot solution of lead nitrate, in order to open the pores of metal and neutralize the cyanide compound within, and then to plunge into the coldest hydrant water obtainable in order to suddenly contract the metal and force the solution out of said pores. It must be remembered that this is only a suggestion of a method and not of some particular chemical salt, viz.:

"To dip the plated ware, after washing in water, into some chemical solution that will actively and effectively combine with the cyanogen radical, thereby producing a harmless compound which will be the color of the metal under treatment and which not having the power to diliquesce will eliminate the bothersome trouble of spotting out."

# THE ART OF METAL SPINNING

THE SPINNING OR FORMING OF METALS TOGETHER WITH THE TYPE OF TOOLS, CHUCKS AND LATHE REQUIRED TO PRODUCE THE ARTICLES FROM THE METAL BLANKS.

BY EASY WAY.

(Continued from June.)

### COPPER SPINNING.

When spinning an article it is an advantage to hold a piece of hard wood against the back of the blank, particularly in the early operations when the blank is first placed on the chuck or after it has been annealed. It first feels very soft and yielding, but in a short time gets harder and requires annealing again, as it is not wise to work the metal when there is a springy or unruly feeling. At all times the tool must bear on the work with firmness and mould the metal gradually without a very large feed. It is not good practice to move the tool from center to circumference only as that would have a tendency to draw the metal away from the center and make it thinner and is more liable to break. When the tool has travelled outward let it return to the center and by this method the metal can be kept the same thickness. The thickness of metal suitable for general articles is No. 20 to No. 26 Browne and Sharpe gauge. For copper in larger work No. 22 gauge is principally used and for brass and zinc No. 24 gauge in articles varying in height and diameter from about three inches to six inches. Metal of No. 26 Browne and Sharpe gauge is easily spun, but care must be exercised because articles spun from it are more easily ruined than they are from the heavier metals. This No. 26 metal is used for the smallest work and only the experienced workmen are successful because of its delicacy. The copper sheet in thicknesses referred to is the most suitable, as it is tough and when annealed, after working, is exceedingly pliable and not shattered easily from overheating and long continuous working.

However, this metal must not be left in the fire to soak, but be as brief as possible and never duplicated more times than necessary. As a matter of fact, the annealing process of the metal blanks will be repeated several times by the amateur, the same as keeping the heat in the steel when forging the tools, and practice is the only doctor and remedy. When spinning is properly accomplished the metal is thinned very little, if any, consequently a good supply of judgment is required. The spinner by a cross-section drawing through the axis of revolution of the article he is about to spin and with compasses steps off the length of the outline desired he will obtain the radius of the disc from which the cup can be spun. Always allow a trifle more than the distance thus determined, should the metal require compressing, and if the metal is not thinned from the operation of tooling there will not be very much over the required amount after trimming and the article is finished. Care should be taken to preserve all the strength of the metal.

Some spinners cover the surface of the blanks with oil when annealing and very often heat the metal until it is red hot and immediately immerse it in cold water which constitutes the softening process. But if the oxide film is burned off with a heat not greater than an iridescent color the pliability of the metal is superior than when raised to a red heat and the firmness of the metal is held intact. A five per cent. solution of sulphuric acid will dissolve oxide on copper and make it a fine dull pink.

### SPINNING OF VARIOUS METALS.

Brass is prepared in the same way and worked the same as copper, though it will become hard more rapidly through the friction from the tools and is by far more difficult to spin than copper. Whenever possible and with consistency the thinnest stock should be used. When annealing, the color of brass does not change as much as with copper and the plan of covering it with oil, when about to anneal, will be found very beneficial and also avoid the danger of ruining the metal. Zinc, compared with copper and brass, is a decidedly treacherous metal as it has a crystalline formation and the friction from the spinning tool makes it more so and due to this molecular condition weakens the metal of its tensile strength. It also becomes decidedly stubborn and difficult to spin, more especially when an abrupt corner is desired. Old time spinners are very cautious when attempting an article in this grade of metal because experience has taught them many stunts, so to speak, of its peculiar qualities and its care during the operations as, for instance, when softening this metal in the fire it is very essential that it be soaked in oil first. Many of the old timers really believe that oil enters and softens the metal. However, whether this is so or not, the oil bath does certainly improve the working conditions. This metal cannot withstand the heat the same as copper and brass as the melting point is near 780 degrees Fahrenheit, and when annealing it is advisable not to exceed 375 degrees Fahrenheit, then plunge in cold water which constitutes the softening process.

White metal and aluminum do not require annealing and both are very easy metals to spin, but more care is required when working aluminum than white metal because it is easily shattered and for that reason it is not as staple as white metal even though it is light and is a good base for plated ware. It is rather difficult to handle and very often when the article is about finished it results in spoiled work due usually to the ease with which it is formed. However, for large work this metal is chosen because of the lightness, where with white metal, heavy stock can be tooled, spun and forced down to any required thickness using a template as the master and guide to obtain an even thickness or wall. This is the favored metal for silver plated ware and unlike the other metals referred to grows soft under friction instead of hard and is very easy to manipulate.

German silver is also spun in many shapes and very often many neat constructions are produced by spinning this metal over highly finished rich wood. However, like brass it is a hard metal and requires annealing often.

### LUBRICANTS FOR SPINNING.

There are several lubricants used by the different craftsmen consisting of soft soap, tallow candle, buttermilk and heavy oil to moisten the metal and help smooth the friction between the tool and blank to be spun. Very often it is well to lubricate the blanks before placing them in the lathe and it is very necessary to keep the metal well greased during the process of spinning and prevent it from becoming dry. On copper soft soap and buttermilk are used; a tallow candle on brass, zinc and copper and heavy oil on white metal and aluminum. They should be applied from time to time as this prevents the tools from grinding and roughing the metal.

### PRACTICAL METAL SPINNING.

Practical metal spinning may now be explained by the

aid of sketches and a very simple piece will be chosen, as for instance, a shallow metal dish. Shallow forms, however, are difficult to spin if they are irregular in the cross-section. Nevertheless they are good practice for a beginner and the writer will endeavor to show with a sketch one without great depth and minus right angle corners (see Fig. 6). The sectional sketch is of the finished article about to be explained and the method of producing same.

A hard wood block is fastened to the face plate and the form of the dish turned in its face with a substantial rim at the outer edge of the chuck form. Then, the metal blank to be spun is located centrally on the face of the chuck and held in position by a wooden cone with an indentation at one end for the point of the center of the tail stock to enter and the cone to rotate on. The other end of the cone may be treated with a thin coating of resin to provide a better grip of contact with the metal blank. The tool rest is then placed in position and the fulcrum pin located in one of the many holes provided. The round nose tool is then brought into action and the metal forced into the chuck form by the tool pressing against the rest pin; thereby obtaining the necessary leverage. When the metal has been spun and the shape finished the diamond point or cutting-off tool is made use of to trim the outer edge of the article, and when finished we have produced a shallow dish of metal.

Next we will consider a more difficult piece that has

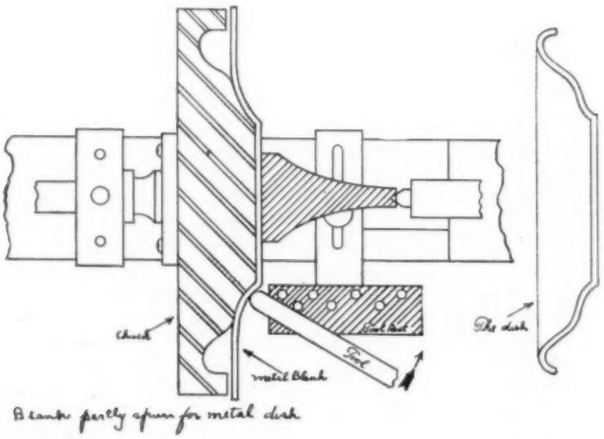



FIG. 6. SPINNING ARRANGEMENT FOR A SHALLOW FORM.

more depth and a smaller diameter. As for illustration a cup form will be chosen (see Fig. 7) due to its depth and the intense pressure to produce the shape. As a duplicate to the wood forms that have been prepared by wood turning tools it becomes necessary to anneal the stock and use more than one form for its production as shown in Fig. 7. Here again all the tools that are required are the round nose for shaping and the parting or cutting-off tool for trimming.

In some cases, as will be described later, split forms are required in order to release the finished article. These forms can be made of wood or metal, but when a quantity of one particular shape is to be spun it is advisable and for economy of time and labor to construct metal forms. It is very necessary in some intricate classes of work that must duplicate each other to have face plates equipped with form blocks and these should not be loosened from their respective plate until all spinning of the articles is finished. This method eliminates resetting of the blocks which would be very tedious and prevents the work running out of true. There really should be no difficulty in keeping the metal a uniform thickness and the same thickness approximately as before cutting the blank from sheet stock. During the operations of producing the cup and dish, if, however, it is detected that the metal is thinning this can be remedied by reversing the movements of the tool. Instead of working continuously from the center out change and travel toward the center of revolution. This will naturally compress the thickness instead of drawing it out. It is very evident and has been proven by practice that an inward movement of the tool will bulge the metal at that point where the blank is held between the forming block and center, and in order to prevent this the first movements of the tool are always, or should always, be away from the lathe center or axis, as this will keep the metal against the form firmly, and is reasonably very important if spinning is to be successfully accomplished.

A firm contact between the metal and form is very essential at the outset or when first beginning to spin and gradually this contact surface is increased from the pressure and movement of the tools. Bulging or, as it is sometimes called, buckling, is a constant danger and often a hindrance and the result of undue compression of the tool; then the metal will begin to feel rough and the tool will seem to jump from point to point. This is when the metal is about to fold or lap. However, if the article is immediately removed and annealed this difficulty can be overcome and thus prevent the shattering of the metal or ruining the article. There are other reasons for bulging which are caused by the operator not keeping the stick in

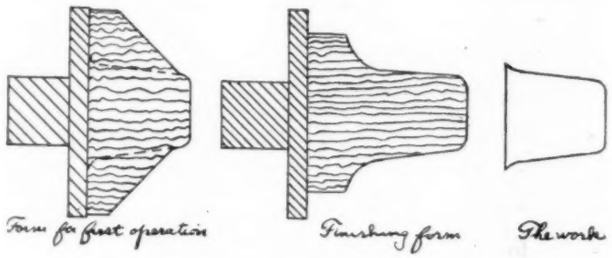



FIG. 7. BLOCKS FOR SPINNING A DEEP FORM.

his left hand opposite the tool point and with sufficient pressure; also too far from the contact surface, and if this is not adhered to on large work the outer portion of the blank will furl the opposite way and toward the tailstock of the lathe. The only remedy for this is immediate annealing. Also the speed must be considered for different diameters because of the centrifugal force the metal is thrown away from the chuck and it is utterly impossible to conform it on account of lack of a corresponding pressure of the tool and should this pressure be applied the wall of the metal is destroyed from undue force. There are numerous articles produced where nothing supports the metal, except at its center, from the moment the blank leaves its circular shape until it reaches the finished form other than the supporting stick and tools of the operator. This is called "spinning in the air," and there are few who are capable of spinning large pieces in the air when the outer portion of the blank requires considerable compression as if spinning at an angle of ninety degrees, but for him that is proficient in the art only one chuck is required for deep forms and the ninety degrees turn, as was the case previously explained.

(To be continued.)

# IMPRESSIONS OF THE EUROPEAN BRASS MILLS

## In Comparison with the American Brass Mills.*

By William B. Edwards.†

My first visit to European mills was in Bohemia, Austria. After arriving at the mill, I found that they were shut down on account of one of their religious holidays. A few men were cleaning up the mill. I inquired if any of the rollers were in the mill at that time. The manager informed me that there were three cleaning the boilers. I looked at him in amazement. I wondered how an American brass roller would look in a boiler in the States. I mention this to show that the Austrian workmen are willing to do as they are requested to do.

### CASTING SHOP.

I found that the casters were a very intelligent lot of men, very careful in their work. They do not have to work nights to hide the great secret of casting their bars of metal. They are accustomed to using a strainer on top of the mould when they pour the metal. This strainer is made out of sheet iron and is lined with clay. Holes are punched through the clay and baked. I understand this is a very old custom, and has been discarded by some of the mills. I must say that in this case it worked out very satisfactorily as the dross that rose to the top of the mould was very short, therefore there was not much loss when the end of the bar was cut off, but solid metal.

I found their metal to be very uniform as its temperature was tested time and time again by a Bristol Pyrometer which I took over with me, as I spent a few hours on this every day during the six weeks I was at the mill.

### ANNEALING.

They do not use wood in their furnaces as we do in the States. They use soft coal the same as is used under their boilers, and also what they call a brown coal. The furnaces are retort furnaces. The Government would not allow them to use wood for such purposes as they conserve their forests, and when a tree is cut down another small one is planted to take its place. They can get good metal, well annealed, in their retort furnaces, as I have proven this without a doubt. I hope the day will come when we in the States, will be compelled to use coal or oil—then we shall see again the beautiful forests like we used to see when we were boys.

I found rather a curious custom in all of the European mills that I visited. They did not believe in annealing and pickling the metal very much. They seemed to be under the impression that it hurt the metal. After showing them how we annealed and how we pickled in the States, and how it was handled, they soon changed their minds and took readily to the methods which we use here.

### OVERHAULING.

After the metal has been broken down, or the first operation of reducing the bars has taken place, it is overhauled and scraped so as to remove the scale from the bars. In most of the mills this was not done except where they found a bad spot, then they would scrape it by hand, but in this Austrian mill they scraped the bars by hand, and when they came to the wide metal they had a small burr attached to a flexible shaft and they ran this over the sheet of metal.

In the American mills we have an overhauling machine like that which I have installed in this mill, and it worked very satisfactorily indeed. We then had three more installed as soon as we could get them built. This machine scraped the length of the bar so that it was entirely clean and free from all impurities which could be seen. After these machines were installed, a great improvement was made in the finish of the brass.

### ROLLING.

In the Austrian mill, I found they had twenty-two inch rolls and were equipped with very well designed housings. In the construction of these rolls, the top roll was not connected but was loose in its bearings and was adjusted by screws located through the top of the housings. It was impossible to roll the metal as we do in the States. They were compelled to make too many passes, but after changing over to the American standard they were able to do more work and to do it more satisfactorily.

They also used a roll built in Germany, that is, a roll contained on one bed coils and coiling devices. It is a beautifully built mill. Steel hardened rolls and a special grinding machine. They are able then to get any surface they wish. Each machine has two or three sets of spare rolls ready to use. They are easily changed over from one set to the other. The largest German rolls we had in this particular mill were twelve inches in diameter, and would roll twelve inches wide. This particular mill rolled a large percentage of metal to be used in the jewelry trade, as Austria is known the world over for cheap jewelry. They use a great deal of Oroide metal which they call Tombach.

They do not have expert rollers on these rolls. A boy not over eighteen years of age takes care of one set of rolls ten inches in diameter and twelve inches wide. The metal that I refer to is three-thousandths thick and true to gauge. This same boy at times in the earlier passes takes care of two sets of rolls with no helper. They run slowly—not over 40 R.P.M. The quality of the metal they turn out is surprising. After installing the pickling, cleaning and slitting machines which were made here in the States, they were able to make brass equal to any one and cheaper than any I have known of.

### GERMAN BRASS MILLS.

I found that the German mills which I visited were more advanced in regards to machinery but not advanced as far as quality and finish of the metal was concerned. They use German rolls as I mentioned in the Austrian mill, also slitters and cleaning machines which are now made in Germany. There are some grades of brass that they do not seem to be able to furnish yet. It is quantity and not quality they are looking for. I know of one large German company who bring all their brass from Bohemia as it seems to meet their requirements so much better than the German brass. I understand they are erecting a very large up-to-date mill near Frankfort, and I also understood that it was going to be controlled by one of our large American concerns. I did not visit this particular mill so I am unable to give a detailed account of it.

### FRENCH BRASS MILLS.

The French brass mills are not up to the Austrian and German mills in certain qualities and finish of

*Paper read at meeting of New Haven Section of American Institute of Mechanical Engineers, New Haven, Conn., November, 1913.

†S. O. and C. Company, Ansonia, Conn.

brass, but are improving fast, as they use a French set of rolls built very much like the German rolls. I mean by this, coil metal. In the large rolls used for breaking down, running down, and finishing, they are superior to the German rolls. I do not think that the workmanship of these rolls is as good as that of the German rolls.

A great deal of the brass made in Europe is in sheets, as they do not use automatic machinery as we do, but I can assure you that the time is drawing near when they will use automatic machinery, as they are good copyists and are striving to capture the trade of the world. There is a great opportunity for the manufacturers of brass machinery to spend some time in Europe introducing more of the improved machines built in the States.

ENGLISH BRASS MILLS.

I found the English brass mills very old in construction, and very old in their ideas. I speak now of one mill in Birmingham. For their motive power they had two engines. The oldest was built by the grandfather, then it came down to the father who thought that this machine was so good that he had a duplicate made of the original. Now the business has come down to the son, a man of about fifty years of age. I was compelled to raise my hat to the two Walking Beam Engines one of which was built about a century ago.

This machine runs the regular stack of rolls as we do in the States. They do not use the German sets. The housings are made so much heavier than the usual construction that they take a larger pinch than the European mills. This I claim is at the expense of the metal. This is one thing that this mill prides itself on being able to reduce the metal so quickly, but it is the old story—quantity and not quality. This mill is run today as it was a century ago.

To show what an old rut some of these mills get into, I know of a firm who wanted this mill to make several tons of brass per month of a certain mixture and of a small tolerance of thickness from center to edge. To do this they would have to grind the rolls finer, and install some up-to-date machinery which would not be any great outlay of money. They stated that they had made money for over a century, and that the mill men knew just what was wanted in the line of their work, so consequently they would not make coil metal. When you see an up-to-date American mill, and see some of the English mills you wonder how they can turn out brass as good as they do. I found the old story again, make the castings at night so as to keep this great secret from daylight. I found it almost impossible to visit an English mill on account of this great secrecy.

WIRE.

In regards to wire. Of the European and English mills, I think that the Austrian mill draws the finest wire and of a much better quality. They draw a great many peculiar shapes on account of the amount used in the jewelry trade. They have improved their methods decidedly during the last five years. I found that the French manufacturers of wire machinery were making great strides, and from what I observed of the French wire machinery, I believe in a short time this machinery will equal that built in the States. They use some rod castings but very few. The metal is simply cut from a sheet by rotary shears and then rounded and drawn.

## THE PLATER AND HIS TRADE PAPER

By P. W. Blair.*

I had the pleasure the other day of hearing the following conversation between a traveling salesman representing one of the leading polishing and plating supply houses and a foreman of a polishing and plating department in one of the large manufacturing plants in Michigan.

"Well, sir, how do you find everything just now?" asked the salesman, who was a practical plater and had been through the mill himself.

"Pretty slow; some days everything is coming O. K., other days I am up against it," said the foreman, looking up from the pages of a yellow newspaper that hid his face, "but things will come out all right before long, I reckon."

The salesman, noticing that there were no trade or technical papers lying around the foreman's desk, remarked, "Taking any trade papers at present, Mr. ——? Do you know, every really progressive and up-to-date plater ought to make it a matter of business policy to read what is going on in his own and allied trades from one end of the country to the other. To keep posted means progress and scope of vision in addition to keeping you informed of the new lines of goods that are being placed on the market every month and also the achievements that are being accomplished."

"Well," chimed in the plater, "that sounds all right, but the thing is I don't get any time to read a trade paper or the journal devoted to my calling that is calculated to interest me even if I want to."

He found time, however, to read a newspaper and to devour it greedily, all the sensational news of the day. Why should he remain ignorant of the many vital things that are coming to pass in the world-wide realm of the plating business? I get thoroughly disgusted with the plater who hates to spend a paltry sum of money for a subscription to a trade paper or become a member of the American Electro-Platers' Society, yet thinks nothing of blowing a five-dollar bill to treat the boys. The trade paper has ever been loyal to the platers and policies of the American Electro-Platers' Society; it has acquainted the plater with the new conditions and news ideas that are springing up in the trade and it is putting him in touch with the doings of his brother platers in other cities and States.

No time to read your trade paper! The excuse sounds feeble, lame and hypocritical. We are not now living in the dark middle ages when most men were steeped in ignorance and apathy and did not care a continental about progress. No, we live in the great twentieth century when new things are coming to pass daily. The conquest of the air is now an accomplished fact, great and revolutionary inventions have been developed to enrich and enhance the conditions of our existence materially and socially; new ideas are springing into being in every avenue of human industry and if we would truly participate in the benefits to be derived from the progress made, we should take steps to bear our part in bringing it about.

*Foreman, Brass Finishing Department, H. Mueller Manufacturing Company, Sarnia, Ontario, Canada.

# DETERMINING WEIGHT OF DEPOSIT

SOME VALUABLE SUGGESTIONS FOR THE CHEMICAL EXAMINATION OF ELECTROLYTICALLY DEPOSITED METAL.

BY L. C. WILSON.

(Continued from May.)

CRUCIBLE TONGS.

As their name implies, they are used for handling crucibles, crucible covers and other small objects while hot. They are made of either brass or iron.

FILTERING FLASK.

A thick-walled glass flask which is used in connection with the suction pump. It should be fitted with a rubber stopper through which a large mouthed filtering tube is passed.

FILTER PAPER.

A number of sheets of qualitative and several packets of quantitative filter paper 9 and 11 centimeters in diameter should be gotten. Any supply house can furnish them.


GRAY FILTER PAPER.

CRUCIBLE TONGS.

FUNNELS.

Three or four funnels, ranging from two and one-half to four inches in diameter will be needed for pouring and filtering solutions.

PIPETTES.

These are glass tubes having the middle part blown into a bulb and used for accurately measuring out small amounts of liquid. A ring or mark around the stem indicates the exact point at which it contains the desired quantity. Pipettes can be obtained in various sizes, and it would be advisable to purchase two 5 cubic centimeter, one 10 c. c., and one 25 c. c. pipette.

RIBBED FUNNEL.

PLAIN FUNNEL.

SPOT PLATE.

A porcelain spot plate to be used when outside indicators are employed will prove to be of service. It is not indispensable, however, and a sheet of white paper may be substituted for it without difficulty.

STIRRING RODS.

Several pieces of glass rod, 4 or 5 inches long and with the rough ends rounded in a gas flame, should be made. They are used for stirring solutions during titrations and similar operations.

SUCTION PUMP.

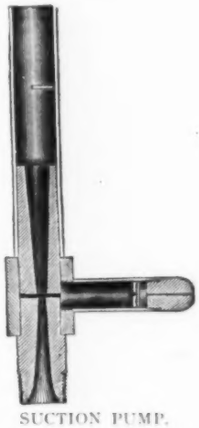
A brass device which creates a strong suction when it is connected to a faucet and a stream of water forced through it. It is used as an aid to quick filtering, is very useful at all times and almost absolutely necessary when a Gooch crucible is used.


WHITE FILTER PAPER.

TRIANGLES.

Consisting of small pieces of pipe clay strung on iron wires so as to form a triangle. Used for holding crucibles while being heated.


PIPPETTE.



SUCTION PUMP.

TRIPODS.

These consist of an iron ring supported by three legs, about nine inches long and are used for supporting triangles and crucibles or other dishes while they are being heated. One will probably be sufficient.

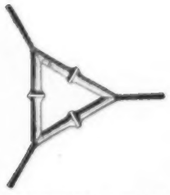
VOLUMETRIC FLASKS.

These are glass flasks of various sizes accurately graduated to contain a certain quantity of liquid. Any supply house can furnish them, and it would be advisable to get one of 250 c. c. and one of 1,000 c. c. capacity.

WASH BOTTLE.

This is a very useful piece of apparatus and may be made as follows:

A glass tube 6 or 7 inches long should be heated in



CLAY COVERED TRIANGLE.

TRIPOD STAND.

a gas flame until soft and then bent to an angle of about 60 degs., some 4 inches from one end, the other end being passed through a large rubber stopper until it protrudes an inch or so. Another piece of tubing about a foot in length should be softened in the flame and bent to an angle of 30 degs. at a point four inches from one end; the other end should then be passed through the cork until it nearly touches the bottom of the wash bottle. A sort of nozzle may be made by drawing a bit of tubing out to small bore in a flame, cutting it in two after cooling, then rounding the ragged edge in the flame and connecting to the end of the long tube by a piece of soft rubber tubing.

As the operator becomes more familiar with the work and the kind of analyses required, other useful or necessary pieces of apparatus will suggest themselves and may be obtained as desired.

Before proceeding with the description of the various ways in which the different metals are estimated, it may not be out of place to state briefly the chemical principles involved. Quantitative chemical analysis is distinguished as volumetric or gravimetric. The former makes use of what are known as volumetric solu-

WASH BOTTLE.

BUNSEN BURNER.

tions, which differ from other solutions mainly in the fact that they contain a certain definite and known amount of reactive substance per unit volume of liquid. Since most chemical reactions take place in accordance with definite laws and in certain exact mathematical ratios between the two reacting substances, it is easily seen that if we know how much active material a certain solution contains and how much of it is required to combine or react completely with a known amount of another solution, it is very easy to calculate exactly the amount of active material in the latter. All such methods are based on this principle. To facilitate calculations and insure uniformity, volumetric solutions are generally made up in certain strengths which are functions of the molecular weight of the salt employed. This may be briefly explained by stating that a salt is composed of two or more elements, using the word in the chemical sense, each of which has its own specific weight called the atomic weight. Obviously then, the specific or molecular weight of a salt is the sum of the atomic weights of the elements composing it.

These terms must not be confused with measures of quantity or mass such as grams, ounces or pounds. All elements are composed of molecules, which in turn are composed of two or more atoms, each of which possesses a certain definite weight. The hydrogen atom is the lightest known and therefore may be arbitrarily called 1 and the atomic weight of all other elements compared with it. Oxygen, for instance, has been found to have an atom which is very nearly 16 times heavier than the hydrogen atom, and, therefore, its atomic weight is said to be 16. In fact,

RING STANDS.

BURETTE CLAMP.

the atomic weight of oxygen is now generally used as the standard instead of hydrogen. In the same way sodium has an atomic weight of 23, chlorine 35.5 and so on. Going a step farther, sodium chloride or common salt is composed of one atom each of sodium and chlorine; therefore, its molecular weight is the sum of these, or 58.5. If now, 58.5 grams (1 gram = 1/28 ounce, approximately) were dissolved in water and the whole diluted to 1,000 cubic centimeters (roughly, 1 quart), we would have a normal solution of sodium chloride. For our purposes a normal solution may be considered as one which contains the molecular weight of the compound in grams, divided by the hydrogen equivalent, dissolved in one litre (1,000 c. c.) of water. Thus, nitric acid has a molecular weight of about 63; since it has only one replaceable hydrogen atom, its hydrogen equivalent is 1, therefore a normal solution of nitric acid would be made by diluting 63.02 grams of the acid to exactly 1,000 c. c.

By taking 1/10, 1/20, 1/50 and so on of the normal weight, we would make solutions 1/10 normal, 1/20 normal, 1/50 normal, etc. These are generally written N/10, N/20, N/50.

From the above it follows that 1 c. c., say, of one N/10 solution is exactly equal to 1 c. c. of any other N/10 solution. An N/10 solution of any acid will

neutralize its own volume of N/10 solution of any alkali.

It is not possible to go into these questions further, but complete information may be obtained from text book on quantitative analysis. Referring now to gravimetric analysis, briefly, the principle followed in this is to convert the metal or element which is being sought into some compound insoluble in water or some other liquid. Having done this, it is an easy matter to separate the precipitate from the liquid by filtering, then to burn off the filter paper and weigh the residue. With this data it is easy to calculate the results.

The foregoing naturally brings up the question of solutions and reagents. It is not practicable at this point to give a complete list of all of the chemicals which will be needed, if for no other reason than that this will depend on the determination which it is desired to make. Accordingly, the reagents and directions covering their preparation for use will be given under the study of the method requiring them. Directions will also be given for making up whatever standard volumetric solutions are necessary, although they can be purchased from supply houses.

Whether or not they shall be made or purchased will have to be decided by each person for himself. Practically all houses can supply any desired solution accurately standardized and ready for use, so that the operator is relieved of all trouble and misgivings. On the other hand, there is a certain satisfaction in knowing that you can be independent and make your own solutions, incidentally saving quite a little money thereby, as they are more or less expensive when purchased. A chemist or druggist friend could probably be called upon to give a good deal of help in preparing them. Perhaps the best way of going about it is to obtain in some way a small quantity of each of the standard solutions needed and then make up your own standards, using the originals only to check them. With a little experience a person can make good solutions in this way with very little trouble. In conclusion, it must be borne in mind that trustworthy results depend largely on pure chemicals, therefore get the best. Whatever added cost this may involve will be more than justified by the increased accuracy which they make possible.

(To be continued.)

## BRONZE AFTER 2,000 YEARS' WATER-IMMERSION

By L. Lodian.

By a long, long process of gradual changing through centuries, the word bronze is a corruption of the ancient city name, Brondisium (the modern Brindisi), a regular port of call in the Calabria province on the Adriatic. Of course, bronze was worked ages before Brondisium was ever thought of; but the natives of that locality made the metal famous to the extent of perpetuating their name to, or in, it; just as the Damas (Damaskus) and Toledo foundry-workers did with steel.

In the Roman national museum is a fine specimen of bronze-preservation after some 2000 years' immersion in water. This is a beam-head from one of the sunken Roman ships of the Lake Nemi. The illustration is of the head of a lioness, with movable rings behind the "locked" incisors. The natural life-likeness of the mask is remarkably striking; because ofttimes on other natural history subjects, the old Roman-period metal-workers are, likely as not, far from the mark in correct animal-portrayal.

Lake Nemi is a body of fresh water; but bronzes lying for hundreds of years in salt water are apparently equally well preserved. In some British museums are bronze objects recovered after three centuries of immersion, from the Spanish armada sunk off the British coasts in 1588. The beautiful green patina or incrustation had been their best preserving-agent. There would be multi-fortunes for the inventor who could so alloy the ferrous metals as to make their oxids become their means of self-preservation—just as the patina-film does for bronze. The old Hindus did centuries ago solve the problem, as is shown by the non-rusting iron mass near Delhi, but the secret, closely guarded by their metal-working clans, was never revealed to the giaour (foreigner), and was eventually lost for all time by the plague-extermination of most of the iron-working guilds. That was some centuries ago. But the huge incorrodible iron pedestal near the ancient capital of India, along with the pesty Bengal, one of the dampest spots in creation, proves they knew how to "leave their marks" in metallics!

On the cathedral doors at Verona are a number of bronze plaques, about a thousand years old. One of them shows a dirigible balloon-airship, with the car beneath, and the tiny figure of a human barely discernible "amidships" thereon. Even the "vent" below the gas-bag is there. The network of bronze "roping" supporting the car for the gas-envelope, has, however, long since corrode away. But then it is known that a practical airship was even built and used by a Greek named Archites some 350 years B. C.

BRONZE CASTING IMMERSED IN WATER FOR 2,000 YEARS.

# ELECTRO-BRASSING*

## An Exhaustive Description of English Practice in the Brass Plating of Metals.

By W. H. Riley.

W. H. RILEY.

The subject of Electro-Brassing is a very extensive one, and I think it will be better to, first of all, deal with the solution. As you all know, a brassing solution is made up of the salts of two different metals, i. e., copper and zinc, and I have looked up, at odd times, the receipts of brassing solutions, both ancient and modern, and have been struck with the great variety of contents, also the number of ingredients, which go to make up the solutions. And I have often wondered what the "poor plater" is to do to put them right, when going wrong. For instance, one receipt tells you to start with the sulphate—another with acetate—another with carbonate. Again, the chloride is used, or the cyanide of the metals, or latterly the red copper compound (i. e., the red oxide of copper). Then one author suggests using one compound of copper and another of zinc, while another suggests precipitation with soda, and the next does not. One adds ammonia, another bisulphite of soda. Then another receipt even tells us to add carbonate of soda to the solution, not for precipitation, but as a sort of conducting salt. Well, with all this wide difference of opinion, what shall we choose for our solution, or I suppose you now think what do I reckon to be the best solution? Well, I can tell you at once that I prefer as simple a solution as possible, for the following reasons:

First.—On account of the cheapness.

Second.—It is easier to make.

Third.—It is much more easier to keep in order.

There are two good ways to make a brassing solution, both simple, and which work extremely well.

1. Making up the solution complete, with about equal weights of copper and zinc salts.

2. To make up the bath as a copper solution, and adding zinc solution afterwards in small quantities, until the desired color is arrived at.

Either the copper and zinc carbonates, or the copper and zinc chlorides make up good baths, but the chloride has the disadvantage of rusting the iron vats, so that leaves us practically with the choice of the carbonates. These may be bought from our friends, who do much for us—I mean the "supply" people—or we can make them ourselves.

Then a real good all-round solution should contain at least 2 ounces of metal per gallon—that will be, say, 1 ounce of copper and 1 ounce of zinc.

And as we decide to make our own carbonates, we shall certainly choose the cheapest salts, i. e., the sulphates, to start with. Now most of you know that if you add washing soda (carbonate of soda) to a solution of the sulphate, or other salt of a metal, you get the carbonate of the metal; and in the case of the sulphate, it will take 1¼ times the weight of soda to that of the copper and zinc sulphates; and as copper and zinc sulphates contain approximately 25 per cent. of their metals, we shall need to say, 4 times the weight of sulphates as the metal we require in solution.

Then our receipt will be something like this, taking, say, 2 ounces of metal per gallon:

Four ounces copper sulphate, 4 ounces zinc sulphate, 10 ounces sodium carbonate (to precipitate). Ammonia (.880)—to clear to azure blue, potassium cyanide 95 per cent. gray (to decolorize), 25 per cent. more potassium cyanide for free potassium cyanide.

The method of making the carbonates and the solution is as follows: Get a tub and place in it the copper sulphate, and dissolve the latter by adding water. Take another tub and dissolve the zinc sulphate in a similar manner. A third tub should contain the carbonate of soda, also dissolved in water. To form the copper carbonate, add the soda solution to the copper solution, being careful not to add the former too quickly, or an evolution of gas will cause the mixture to rise up and overflow. Add until the proper proportions are mixed. Repeat the same operation with the zinc solution. Test the solutions with litmus paper (both blue and red) and see that the effect is neutral with both papers; but if anything the red litmus paper should be turned slightly blue—showing the solutions to be slightly alkaline. In the copper solution a green precipitate should be formed, and in the zinc solution, a white one. Both solutions should be allowed to stand for a time, and then the liquid in both tubs should be decanted off, leaving the precipitates of copper and zinc respectively, which should be washed thoroughly in a strainer consisting of four pieces of wood and having a stout calico bottom. Mix the precipitates together in the vat with water, and add ammonia until the solution begins to clear and just slightly smells of the former. When the solution just smells of the ammonia, and the solution is a green azure blue, then it is correct. Add the potassium cyanide, which may have been previously dissolved in water, or it may be suspended in baskets, in the solution, until the latter just clears. Then add 25% more dissolved cyanide to the solution. Sometimes a larger amount is required and sometimes less. Boil the solution well and allow to cool.

(*c*) Arsenic in small quantities may be added to brighten the deposit.

Receipt for "Bright":—

| | |
|---|---|
| 1 oz. Arsenic.<br>4 ozs. to 8 ozs. Potassium Cyanide.<br>1 pint water. | } dose, 1 oz. to 100 gallons. |

Just now I said use 2 ozs. of metal per gallon. I give you this as a base, which is a good all round bath suitable, say, for a general plater, but other strengths may be used, and a solution will work with as low as ¼ oz. metal, or even up to 4 or 5 ozs. metal per gallon, and this brings me to another point that different work oftentimes plates—deposits—considerably better in different solutions. For instance, heavy brassing would hardly do in a solution of ½ oz. of metal per gallon, and so for brassing—say, motor fittings, and such like work, a solution with about 4 oz. metal per gallon would be advisable, while for light close bright work, I should use a weaker solution—say ½ to 1

*Paper read at General Meeting of the Institute of Electro-platers, Birmingham, England, December, 1913.

oz. of metal per gallon, and with heavy brassing, I should use little arsenic, with light work—close work (pens, rings, etc.) and basket work, much more arsenic would be desirable.

Then as to heat of brassing solutions, what a difference of opinion there is. I remember doing a lot of experiments some years back, in that Special Class Mr. Baker mentioned to you last month, on the different brassing solutions, also with different heats from cold to boiling; and it is surprising how the resistance of the bath lowers as the heat goes up. Therefore, I have come to the conclusion that some baths are best worked hot, while others should be worked cold. For heavy brassing, I should use a hot bath—real hot, while for brassing "small stuff," I should use a cold or nearly cold bath. Very bright work seems to be better in cold (say up to about 70° to 75° F.) baths.

In brassing heavy work one notices, at times, after the work has been in some time that it is covered with minute blisters. Now I think this is due to hydrogen, having a sort of electrolytic cleaning process on the work and pushing up, or tending to lift off the deposit. Therefore for heavy deposits it seems desirable to keep down the hydrogen. This can be done by:

1. Making the solution rich in metal.
2. Keeping the bath hot.
3. Not having too much "free Cyanide."

We can then use a good useful current density without evolving too much hydrogen.

Again we notice the wide variation of voltage, one plater uses 2-3, another 5-6, while others cannot seem to manage under 8-10. Well, I've seen and used many brassing baths, and have come to this conclusion—the man that uses very low voltage has usually got his bath very poor in metal. There are exceptions, such as doing special work, but I mean generally speaking, while the man who has extremely high voltages has, I feel sure, the resistance of his bath too high. I have found that wired work takes anything between 1½ to 4 volts, basket work from 2-5 volts, sheet work 4-6 volts, according to condition of bath and anodes. When volts begin to climb, anodes usually are beginning to "clog."

This brings me to the use of instruments. Now I have found, nearly everywhere, the proper use of instruments is not understood by the average man, and that instruments of the proper type are not used. What you want is a real good *dead-beat* instrument. You want a voltmeter and an ammeter. The voltmeter graduated in, say, 1-10ths to 7 for one class and 1-5ths to 12 in the other class, and the ammeter in "*even ones*" throughout the scale.

Now, while working especially with repetition work, one can tell at once if the bath is getting low in "free Cyanide," or the anodes starting to "clog." The volts will rise and the amperes will fall. You will notice this long before it is noticeable by the solution or anodes. Therefore, every plater should possess both voltmeter and ammeter for each bath. The advantages are:

1. Better and more uniform work.
2. Ease of telling the condition of bath.

Next we come to the very important part of the paper.

### Faults.

What are the usual faults? Perhaps it will be best to classify them.

| FAULTS. | CAUSE AND REMEDY. |
|---|---|
| (*a*) Too red. | (1) Bath too hot.<br>(2) Want of zinc salt.<br>(3) Addition of a little arsenic.<br>(4) Addition of ammonia.<br>(5) Sometimes the addition of Cyanide of Potassium, owing to anodes clogging, and current density not being high enough. |
| (*b*) i. Too pale.<br>ii. White on edges. | (1) Too cold—raise heat.<br>(2) Too much free Ammonium Hydrate.<br>(3) Too much free Cyanide of Potassium.<br>(4) Too much free "Bright."<br>(5) Add copper salts. |
| (*c*) Too thick looking. | (1) Current density too high.<br>(2) Absence of arsenic.<br>(3) Sometimes zinc salts added will put the matter right, and help to brighten. |
| (*d*) Too gray. | (1) Too much arsenic, work through, boil, or add copper salts. |
| (*e*) Peculiar pink on edges. | Sometimes appears to want zinc, but requires copper salts. |
| (*f*) Golden Color. | This usually terminates if current density is highered. In zinc colored edges, add copper salts or heat up solution. Use very little arsenic. |
| (*g*) General cussedness (as the Yankees say). | This is a real bad symptom (consumption I should take it to be).<br>(1) First test with hydrometer. If an old solution and too high a reading, say, 18° to 24° Twaddle.<br>(2) Then clean out the bath, syphon, off clear two-thirds of the solution and throw the rest away.<br>(3) Fill up with water.<br>(4) Add zinc salts till zincking on edges takes place at normal current density.<br>(5) Add little copper salts till color correct.<br>(6) Add arsenic to brighten. |
| (*h*) Anodes clogging badly. | (1) Want of "Cyanide."<br>(2) Want of ammonia.<br>(3) Using too high current density.<br>(4) Solution poor in metal. |
| (*i*) Blistering badly. | (1) Work not clean.<br>(2) Scale on work.<br>(3) Using too high current density.<br>(4) Solution rich in chemical impurities.<br>(5) Too much free kcn. |

In fact, in all cases of doubt, add zinc salts until deposit whitens on edges, and then bring back with copper salts. I find this a safer way, and less costly, but not to be used always, only in cases where bath seems to defy all ordinary symptoms—this will in 9 cases out of 10 put the bath all right. In the tenth case—a real obstinate one—take about half the solution, and fill up with water and *boil*. Then treat as before.

This covers, I think, gentlemen, all the usual symptoms. As for Anodes:

Rolled best yellow brass are extremely good, while in some cases electrolytic copper offers many advantages.

### Discussion.

Mr. Baker said they had all heard, with great pleasure, Mr. Riley's paper. He would like to make a few remarks. A firm called him in, some years ago, and asked him to help them in regard to the making of a solution for brassing zinc sheets.

Their old foreman had left them, and his successor was not very advanced in electro-brassing this special line. Mr. Baker directed that the copper and zinc carbonates should be prepared in the manner Mr. Riley had described. After the copper and zinc carbonates had been obtained, and had stood for some time, Mr. Baker instructed the plater to pour off the clear liquids and leaving the precipitates. The employer got alarmed, thinking Mr. Baker was throwing the solution away, as his foreman had previously decanted off the clear liquid and had used it for the solution, throwing the precipitates away! Experience had proved that 1¼ times the weight of sodium carbonate was required to precipitate the weight of copper and zinc sulphates. Mr. Riley had referred to the rusting of iron tanks when chlorides were used in the solution. It was perfectly true. He remembered some years ago examining a silver solution that had gone wrong. It was an iron vat, and there was a roll of iron around the water line. The fault was immediately apparent. He instructed that the solution be syphoned off and filtered, and the vat to be thoroughly cleaned. When the solution was replaced in the clean vat, normal working was resumed. Mr. Baker thought it worth while to determine the effect on iron with a silver chloride and a silver cyanide solution. He found that a piece of iron placed in the silver chloride solution, rusted immediately, whereas the piece of iron immersed in the cyanide solution was hardly affected. He agreed with Mr. Riley that ammeters and voltmeters were necessary for the efficient working of all solutions.

Mr. S. Field, A.R.C.Sc., F.C.S., who sent a written contribution, said that it was with much pleasure that he ventured a few remarks, as a contribution to the discussion on Mr. Riley's paper on "Electro-brassing."

He must, however, first use the opportunity of expressing his appreciation of the manner in which the "Institute of Electro Platers" had inaugurated its work—a work, to his mind, of the most profound importance to the industry, not only of Birmingham, but of the whole of the country, and he sincerely trusted that the work of the institute would develop, until it attained dimensions of a national order.

Mr. Riley, an old friend, had kindly sent him a summary of his paper, which formed their subject that night. "Electro-brassing" had its many points of interest, and its one-time mysteries were gradually being cleared up, by the combined work of both the practical and technical man. Indeed, loyal co-operation of the two branches of experience would go a long way towards solving many, if not all, of the pressing problems of plating.

(1) With Mr. Riley they would, he thought, all unite in advocating solutions of simple composition. Nothing should go in unless it was known to serve some good purpose, and even then, its quantity must be kept under control.

(2) Copper carbonate, a most important starting point, was best prepared and used fresh. Some samples of the commercial product had shown, by analysis, undue proportions of impurities; those which were insoluble being soon observed.

(3) With reference to the increased conductance of the warmed bath, it was well known that there was an approximate increase of 2-2½ per cent. per degree centigrade; this figure applied to most solutions.

(4) Referring to the relative ease of depositing hydrogen, copper and zinc, it was difficult to express it quantitatively in a simple manner. In "acid" solutions, the order was copper, hydrogen and zinc, the last-named being, of course, most difficult. In the cyanide solutions, the order was changed to hydrogen, copper and zinc—the last two being now much closer than in sulphate solutions. The relative quantities of each would, however, be influenced by their proportion in the solution.

(5) On the matter of voltage, in an adequately warmed and stirred solution, a good current density could be attained with *comparatively* low voltages. A low E.M.F. need not mean that the solution was poor in metal. High current densities, naturally, demand higher E.M.F.'s, not only to overcome what was called the "ohmic" resistance of the solution, but to overcome also the "clogging" effect on the anode, which, with exactly the same solution, would not occur with lower current densities. Mr. Riley was quite right, instruments were more sensitive than our mere judgment by inspection of the anodes and deposit.

(6) Anodes did not "clog" directly on account of only a little metal in the bath. Free cyanide, current density at anode, temperature, and rate of stirring, controlled clogging.

(7) Redness, when *not* due to copper content, current density or temperature, was induced by *too much* free cyanide. It would be interesting to know if Mr. Riley's point 5, under fault a. (redness) was confirmed by others.

(8) The hydrometer test for a "consumptive" bath ought not to be relied on. Accumulated compounds quite prevented the hydrometer reading being any guide as to the metal content. Each solution would, of course, need special treatment, but saving two-thirds of the bath meant saving two-thirds of the soluble impurities. We scrapped a gas mantle, when it ceased to *effectively* produce light; to use it further means false economy—waste. A similar thing was true for plating solutions, subject always, of course, to experience and discretion.

(9) One last point must not be overlooked. The fact that zinc and copper, in these cyanide baths, moved as complexions toward the anode, necessitated mechanical methods of stirring. Warming did much to maintain uniformity, but the best conditions were those which brought the metallic compounds, formed at the anode, to the cathode, and the free cyanide, produced at the cathode, to the anode, where its essential work was to be performed.

In conclusion, he had much pleasure in adding a word of commendation of the paper, and he should look forward to reading the full report of the meeting in due course.

Mr. Giraldus Jones said, before venturing to offer any comments, he would first like to compliment the author on his excellent paper, with which he was inclined to agree.

There was one important aspect of the problem of electro-brassing, with regard to which he would say a few words, and that aspect was the question of costs of making up brassing solutions from various formulæ.

For the purpose of illustration he would give a few examples of solutions, all made to contain the same amount of metal per gallon.

Take solution No. 1, made from the following. The proportions of copper and zinc may be anything, provided the amount does not exceed figures given for copper: Ten ounces copper sulphate, approximate cost, say, 4d.; requiring 16 fluid ounces of liquid ammonia, cost, say, 4d.; to decolorize, 14 ounces single potassium cyanide, 6 ounces single free cyanide, cost, say, 1s. 3d. (95 per cent. white), per gallon. Total cost, 1s. 11d.

Solution No. 2.—Sixteen ounces copper sulphate, approximate cost, 4d.; 20 ounces soda crystals to ppt. as carbonate, cost, 1d.; 20 ounces 95 per cent. white cyanide (S.S.), cost, 1s. 3d. Total cost, 1s. 8d.

Solution No. 3.—Copper carbonate, 8 ounces, approximate cost, 5d.; cyanide potassium, 95 per cent. white S.S., 16 ounces, 1s. Total cost, 1s. 5d.

So that from these figures he fails to see why any electroplater makes his own carbonates, seeing that it is cheaper to buy the ready made, and equally reliable.

So far as carbonates go they are more troublesome to keep in order than the prepared salts or cyanide solutions, and in the long run were very little cheaper.

With regard to heavy brassing, Mr. Jones felt a little surprised that the author recommended "real hot solutions," because in his experience (and it was not inconsiderable), he had obtained excellent results from cold heavy brassing solutions, and further, the results were being obtained daily with unfailing regularity. Of course, this solution is specially prepared, and differs from the ordinary variety.

A recent test gave the following figures:—

In 10 hours a deposit of 5-1,000ths of an inch was obtained. (Micrometer readings were taken.)

The cause of the blistering was generally considered due to the occlusion of hydrogen, but there are other contributory causes, such as dirt, etc.

Electro-platers favor the use of sodium bi-sulphite as a conducting salt, and its actual function is to form a cuprous sulphite which is more easily dissolved by the cyanide.

Hydrometers are certainly apt to be misleading as a guide to the amount of metal in solution, because the total density of a solution is raised by the other ingredients.

Now a word in reference to the E.M.F. required for brassing solutions. This depends on the nature of the work and the amount of deposit to be effected in a given time, and may vary from 2½ to 5 volts for still vats employed for general lines; the longer the immersion the lower the E.F.M. employed.

He had had no trouble using cold solutions, so far as uniform-

ity of color went, and he sometimes had four sheets in the vat, each sheet having 24 square feet superficial area, and the time occupied in the vat had not to exceed three minutes.

The author's remarks on the subject of dead-beat instruments were praiseworthy, but there was the difficulty of increased costs.

The rise in the E.M.F. indicated when a decrease of current flowing through a vat was effected, was, in his opinion, more an electrical property than a chemical one. Anyone studying the characteristic (B and H) curves of a shunt wound dynamo, would observe that any decrease in the current flowing in the external circuit would be accompanied by a rise in the current flowing in the shunt windings, which immediately increased the magnetic flux or field, and in consequence raised the E.M.F.; the reverse taking place when the external circuit became loaded.

In reply to a question in regard to imported brassed zinc, the sheets were not usually lacquered unless specially ordered, and he had not come across any lacquered sheets.

The peculiar golden shade, so much desired by manufacturers of coffin furniture, who are the principal users of brassed zinc, is obtained by first coppering the sheets for 30 seconds (flashing) and then immersing in the brass vat.

The final finishing of the sheets is not accomplished with the aid of "compos," but instead a mixture of either petrol, methylated spirit kerosene, or turpentine and slack lime.

As to the cause of pitting, he considers this due primarily to electrical conditions, although chemical causes may help to give rise to those conditions. Hydrogen is a non-conductor of electricity, and when a hydrogen bubble settles on a given spot, that area, immediately covered by the hydrogen bubble, is practically insulated, or cut out of the electric circuit, and the deposit builds up around the bubble, leaving a cavity which we term "pin-hole."

Mr. Spall congratulated Mr. Riley on his paper. Regarding the question of new and old solutions, his experience was that you could take great liberties with the latter, but not with the former. He had not made a new solution for years, as he would have to work it some considerable time to get anything out of it. He "tinkered" up his old solutions, instead of making new ones, and he would never make up a new solution if possible. In regard to the use of ammonia, he had never used it, in the way Mr. Riley had described, with cyanide. He added a little arsenic and worked round until he got the proper deposit. He did not hear Mr. Riley mention the question of "green" deposits—the most serious thing which platers had to contend with. The addition of cyanide had no beneficial effect, and in some cases the deposit would work red in the centre, but had a greenish look about it. He asked Mr. Riley if he could give him a remedy? In regard to the use of bisulphite of soda, he had never used it, but thought it well worth trying.

Mr. W. Goodchild said it was a very lucid paper. There were a great many platers who used iron tanks for brassing, and in regard to their corroding, this was aggravated by the use of chlorides. There were platers in Birmingham, using cast iron tanks, and who did not use chlorides, only the cyanide for the copper and zinc carbonates, but the corrosion still went on. He used an iron tank and found it corroded, as cyanide will attack the iron. Hence, if only cyanide and the carbonates of copper and zinc are used, it will not eliminate corrosion entirely. In regard to the advantage of making one's own carbonates, this depended on circumstances, as many platers had not the tools, nor the room, nor the time necessary for making their own carbonates. Again, under the conditions existing in the average plating shop, dirt and other foreign matter was liable to get into the carbonates whilst being made. He did think there were many platers who made their own carbonates. In regard to the question of costs, he agreed with Mr. Jones that it was cheaper to buy them already made up.

When plating articles made of strip iron, and color of work denoted want of zinc, a high current density would bring the required color without adding zinc salt. However, the qualities of the strip iron varied so much that when using 5-6 volts, some qualities would show a proper brass deposit, while others at the same E.M.F. would show copper and zinc deposited separately. On the matter of even quantities of the salts, his experience was that the general rule was 3-4 times the amount of copper to one of zinc was necessary. A solution, made up of equal quantities, would be all right if worked for a week or fortnight, but from a commercial point of view this was not practicable. Blistering was caused by too much "free" cyanide. The latter was very useful in a moderate amount, as it had a cleaning effect on the steel, and he knew of firms who, when brassing small cheap work, placed it direct in the solution without previously passing through the electrolytic cleaner. Blistering was not caused so much by the work being greasy as by the presence of a too great quantity of "free" cyanide which resulted in the evolution of hydrogen gas.

Mr. Taylor said that in regard to brassing, he had not had much trouble, he used the double cyanides, but required four times the amounts of copper to that of zinc, and balanced up with cyanide. He never experienced any trouble.

Mr. Lane said in regard to "cussedness" Mr. Field did not think it advisable to have the parts of the solution, but, when it got into the same state as the gas mantle—useless, it should be thrown away, he (Mr. Lane) saved three parts of the clear solution, and threw the remainder, with the sediment away, and followed as Mr. Riley had said. He found with this method that the solution gave as good results as formerly. He would like to know if sheets were lacquered after brassing. The German sheets had a beautiful golden color.

Mr. Walker said that Mr. Riley's paper would be most helpful to platers who had not had much experience in brassing.

Mr. Thornley made some very amusing remarks in connection with his first experiment with brassing. He had found that the green color, mentioned by Mr. Spall, was caused by the use of soda salt, as when he gave up their use, he obtained golden yellow tints, although he still sprinkled a little bisulphite of soda on the surface of the solution.

REPLY.

Mr. Riley, in his reply, said that Mr. Field did not seem to think that cyanide caused redness, but if the work is hastened, the addition of cyanide allows more current to pass through the solution.

Mr. Jones preferred the single cyanide already prepared. He, Mr. Riley, had never tried it, and in regard to the use of bisulphite of soda, as a brightener, he had never used it. In regard to the question of volts rising and amperes falling, he did not think it was due to the dynamo. Take the case of an extra large dynamo, a plant. One vat only took a small percentage of the total current. It was due to the lack of free cyanide; and not to the dynamo, that both volts increased, and the amperes decreased. In regard to the relative costs of metal salts, he thought there seemed a lot of impurities in the "ready made" kind of copper carbonate. Mr. Spall had said that he liked old baths, he (Mr. Riley) meant very old baths. In regard to brassing copper and dipped work, the trouble was in regard to spotting. The green deposit was assisted by impurities in the bath. Raising the temperature of the bath was effective, and also the addition of a little copper salt and brightener. Mr. Taylor's freedom from trouble was due to the fact that he kept his solution chemically clean. He had found, like Mr. Goodchild, that rusty vats were caused by impurities getting into the bath, and this may be due to insufficient swilling. Different quantities of the same metal required different densities. He had found equal quantities of metal in the solution very effective. The use of too much free cyanide was frequently the cause of blistering. In regard to zinc sheets, he had only seen some special sheets lacquered, but if the sheets were allowed to stand, the color of deposit improved.

Mr. Baker said that at the Technical School, they used accumulators, and every vat had a voltmeter and ammeter. At the silver vat they used to have 10-20 students and the volts and amperes were constantly being read. At first, the conditions in regard to the current were normal, but soon the volts would rise and the amperes decrease. What did that denote? It was nothing to do with the dynamo, as accumulators only were used. The reason was that the bath was getting defective in free cyanides. If they added 20 fluid ounces of 10 per cent. cyanide solution, the volts dropped, while the amperes increased, and normal conditions were restored. He proposed a vote of thanks to Mr. Riley for his paper, which was seconded by Mr. Busby, supported by Mr. Speak, and carried unanimously.

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### RANGE OF THE SCHOOP PROCESS.

The most diverse metals can be used—lead, tin, zinc, aluminum, copper, brass, etc. The inventor also anticipates a successful use of glass and enamel. Very thin coatings can be produced for purely decorative purposes, or thicker ones that can be polished by ordinary methods, and if desired removable coatings several millimeters thick for reproducing medals, etc.

# GOLD: ITS TREATMENT, ADAPTABILITY, AND STRANGENESS

By James Scott.

The first striking fact connected with gold is that thin sections of the substance, such as pure gold leaf, exhibit a beautiful *green* color when viewed by transmitted light. It is not every worker in the precious metal who is aware of this peculiarity, which will be again referred to, when I will describe other strange features. Gold is generally found in the metallic, or native, state. It exists in the river sands and soils of most countries, though in too sparsely distributed quantities to be worth attention from the miners' point of view. Sea water is believed to contain a grain of gold in every ton. The total amount in the ocean, therefore, must be enormous; but how are we to extract it by paying methods? When gold occurs in veins there may also be present sulphides of various baser metals, which, of course, interfere with its removal. Some of the rocks containing gold have been broken down, and their detritus or powder distributed in different directions; much of it being washed down into streams, and thence to rivers and seas. In river beds it may consist of grains too tiny to be separately seen by the naked eye; and range from these dimensions up to large nuggets. Very often these grains are rounded by the rotating action of the traveling water.

FIG. 1. GOLD SAND, WITH QUARTZ, FROM AUSTRALIA, SEEN THROUGH A MAGNIFIED PINHOLE.

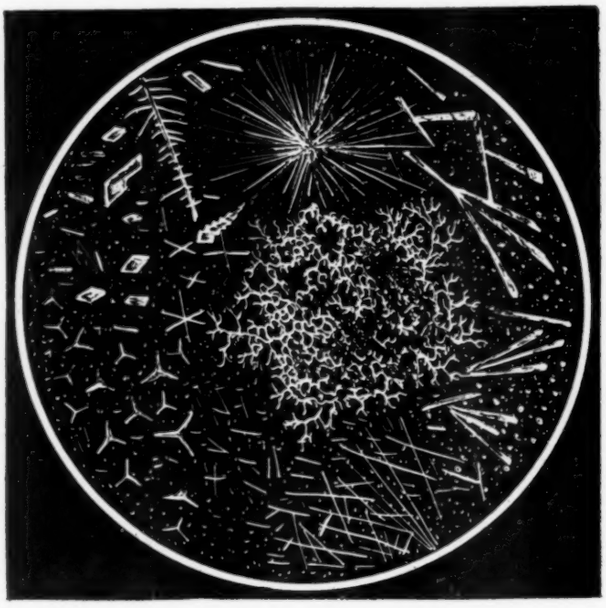


FIG. 2. A MAGNIFIED PINHOLE SHOWING THE APPEARANCE OF GOLD WHEN IMPREGNATED WITH CHLORINE.

In Fig. 1 are shown some angular particles of native gold among glassy quartz crystals and sand grains. Sometimes it is found with silver. For removing it from river sand or detritus these substances may be mixed with water and repeatedly stirred. The gold, being far heavier than the remaining suspended matters, rapidly settles to the bottom of the vessel. The liquid is then poured off, thus carrying away the chief impurities. These alluvial deposits are called "placers," and are found chiefly in the Urals and Siberia. Small ones also occur in Scotland, Ireland and Wales. They may, of course, be found in the vicinity of the more important rock formations.

California and Australia must be regarded as the principal gold yielding centers. It is also worked in commercial quantities in Mysore, New Zealand, and Abysinnia, although the quantities produced are very much reduced.

Rocks containing gold are crushed and shaken with mercury, which dissolves the precious metal. The amalgam is then pressed in leather bags to remove as much as possible of the mercury, and the slightly impure gold that is left is subjected to distillation to free it from the rest of the mercury.

The auriferous rocks of California are broken up by means of powerful jets of water discharged from pipes arranged at very high altitudes. Favorite methods of treatment have been to crush the rocks and then stamp them to powder, which was passed (in a current of water) through sieves fitted to the apparatus, the meshes varying from 1/20 to 1/40 inch in diameter. Much of the gold settled on amalgamated copper plates; but that which escaped was separately dealt with. The pulp was concentrated by passing through sloping troughs fitted with bottom blankets; or by shaking the flow on rubber belts; or by allowing the heavy particles of gold to subside in conical receptacles. As a rule, cross pieces, called riffles, were laid on the bottom of the tilted contrivances. The addition of mercury to the riffles to dissolve the gold which reached them was frequently practiced.

When pyrites is present the substance is chlorinated to produce a chloride of gold. Sulphide ores are roasted to oxides, by elimination of the sulphur, and may be submitted to a second roasting after moistening with salt to form a chloride solution which at highest temperatures is decomposed, leaving only the gold behind in a finely divided condition. Then large revolving vats containing chlorine gas receive the gold, which has been previously watered. The chloride thus caused is treated with ferrous sulphate; the consequence being that the gold is precipitated in a fairly pure state. The concentrated gold is then treated in grinding pans containing mercury, which dissolves the gold. Excess mercury is afterwards squeezed out, and the residue distilled to leave only gold.

The more popular cyanide process consists of leaching the finely divided ores, concentrated gold, or slimes, with

a very dilute solution of potassium cyanide, the amount of the latter being between .05% and .3%. Its equivalent of sodium cyanide may be used instead. The compound is allowed to remain undisturbed for twelve to twenty hours, so that the gold may be thoroughly dissolved. The solution is run off, and the gold precipitated by clean zinc shavings, or by electrolysis. As a rule, 1½ grains are wasted beyond recovery in every ton of solution.

The symbol for gold is Au, the Au having been derived from the Latin *Aurum*. Gold cannot be dissolved or affected in any way by either common acids or alkalies. To reduce it the *two* acids, nitric and hydrochloric, must be employed. This medium is known as *aqua regia* (i. e., royal water) and is made by mixing together one part of nitric acid with two to four parts of hydrochloric acid. Neither acid, singly used, has the slightest effect on gold. The dissolving action is due to the chlorine released from the hydrochloric acid by the nitric acid, since chlorine gas, in solution, is capable of dissolving the metal. A bright, yellow solution results when the metal is thus treated, and this when evaporated yields auric chloride, which can be turned into aurous chloride by heating it to a temperature not beyond 185 degs. C.

If some of the auric chloride formed in the way mentioned above be gently heated on a glass slide until a solid red ring occurs *round it*, the substance will in a few moments disclose a microscopical sight of the kind depicted in Fig. 2. The various crystals, which are yellow or red, consist of gold in combination in different proportions with the chlorine. When more strongly heated a deep red *patch* results, and an idea of this is given in Fig. 3. All solutions of gold salts will leave films or residues of gold behind when sufficiently heated. A solution of gold chloride simply evaporated crystallizes as in Fig. 4.

Concerning the wonderful malleability of gold it is surprising that a single grain of this metal can be hammered out to a leaf surface of about fifty square inches, or drawn to a thin wire several hundred feet long. Gold is beaten to leaf between sheets of vellum or thick skin, which are cut up in successive relays, to the familiar size. The metal may be hammered to a thinness not exceeding .00005 of an inch. The melting point of gold is 1.067 degs. C., while the metal will volatilize at the temperature of the electric arc.

To see the brilliant green color already referred to it is only necessary to lay a piece of gold leaf between two panes of glass and hold it up to the light. The effect is best when a magnifying glass is used. If examined under the compound microscope no trace of the yellow or gold hue is visible provided the leaf is unpuckered. We see a kind of rough green field. By sufficiently heating the leaf, the resultant tint will be changed to red. No signs of these colors can be seen during the ordinary way of inspection. When light is transmitted through the leaf in the manner described the substance becomes semi-transparent or translucent. Readers hardly need reminding that gold never tarnishes in either air or water, so that the presence of these colors is very curious.

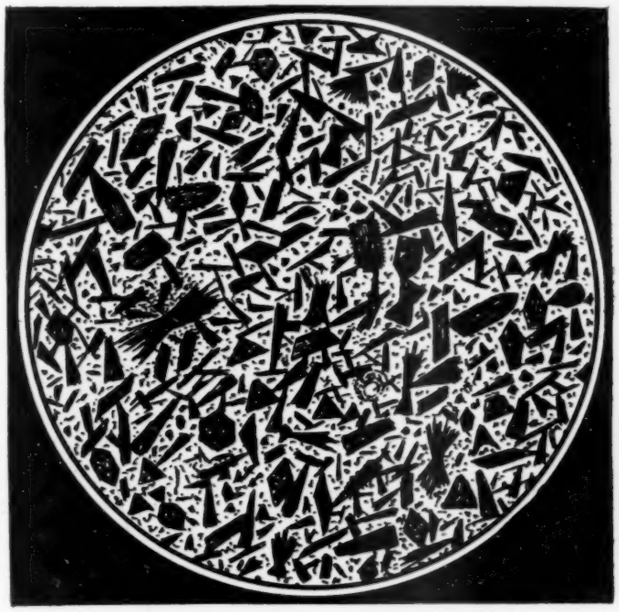


FIG. 3. A MAGNIFIED PINHOLE, WITH SOME DISSOLVED GOLD HEATED TO REDNESS, IN WHICH CASE ITS PARTICLES ARE OPAQUE AND SEMI-CRYSTALLINE.

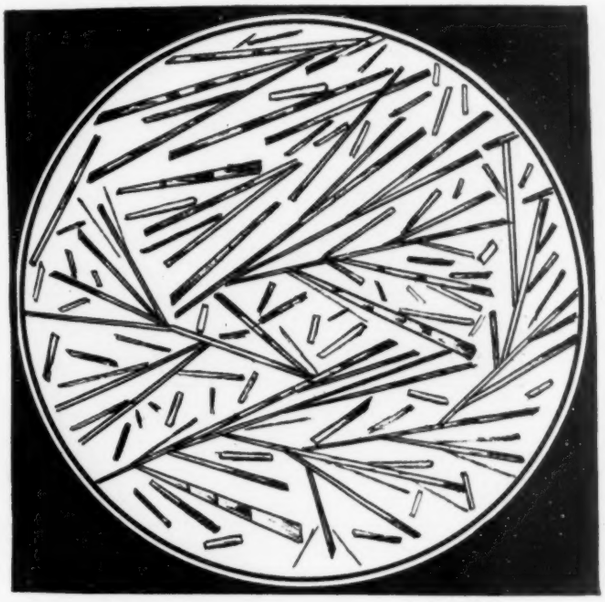


FIG. 4. GOLD CHLORIDE CRYSTALLIZATION; THE ACTUAL DISC (HERE MAGNIFIED) BEING ABOUT ¼ INCH IN DIAMETER.

As gold would by itself too quickly succumb to wear and tear in constantly being handled as coins, the latter as sovereigns and half sovereigns, consists of 22 parts of gold alloyed with two parts of copper, the latter being sufficient to harden the metal. This is known as 22 carats, because pure gold is reckoned at 24 carats.

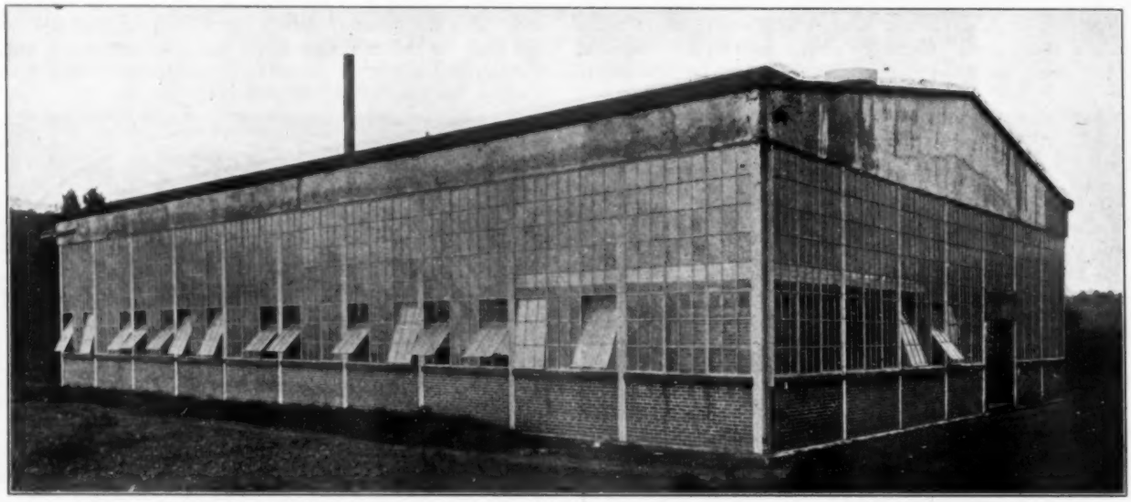
## ALUMINUM IN AUTOMOBILES.

While aluminum is utilized for only a comparatively small part of an automobile, the amount of this metal used in a year by a firm which manufactures 50,000 automobiles annually reaches an impressive figure. The Willys-Overland Company, of Toledo, Ohio, finds use for 5,400,000 pounds, or 2,700 tons of aluminum each year. An average of 18,000 pounds of aluminum is used in the foundry every working day. Such parts as the gas intake and water manifolds, crank cases, reduction gear cover, hand-wheel spider, clutch spider, bearing of the running board and the toeboard, hub caps and many other parts are made from aluminum, which has the double virtue of combining strength with very light weight.

# NEW MODEL TUBE PLANT

A Brief Description of the Plant of the National Company at Waterbury, Conn.

The National Company, organized to make brass tubes from 1¼ inch to size 0, has begun operations in its new model plant on Brown's road, in the western portion of Waterbury, Conn., near the plant of the Waterbury Rolling Mills Company. This company is incorporated in Connecticut and has a capitalization of $50,000. Its officers are: President and treasurer, Michael J. Byrne; vice-president, Arthur A. Tanner; secretary, George M. Beach. Mr. Beach also is superintendent of the factory.



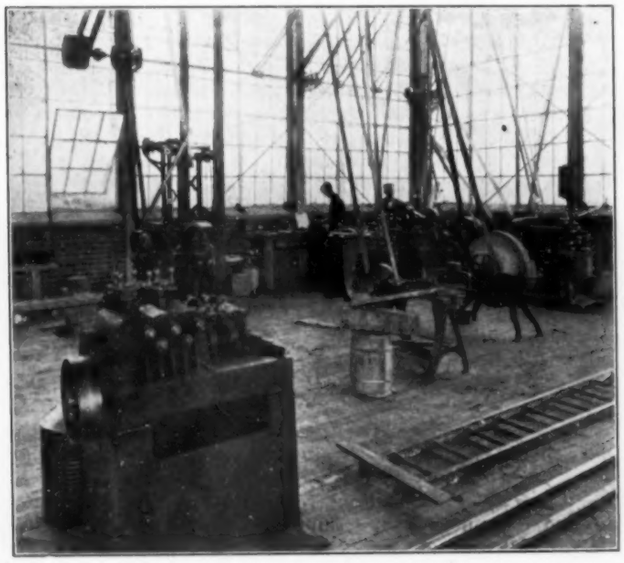
THE PLANT OF THE NATIONAL COMPANY, WATERBURY, CONN.

About the middle of July the tube drawing department of the factory began work and the officers report numerous inquiries at this time.

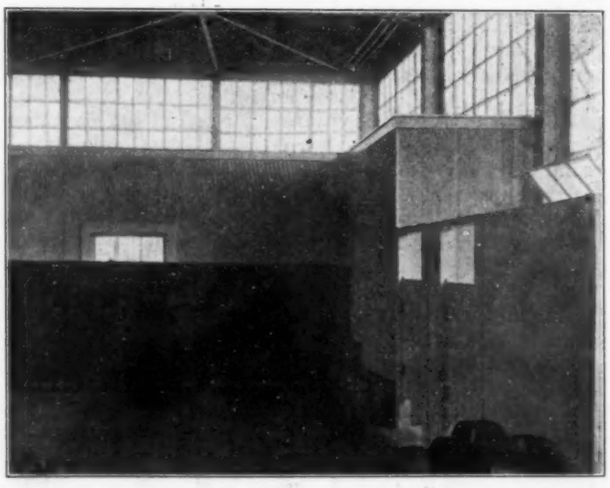
Situated about the center of an eight-acre site, through which the Naugatuck division of the New York, New Haven and Hartford railroad runs as well as Steele's brook, a generous contributor to the Naugatuck river and borderd by the highway on the east, the plant is well located from every point of view. The building itself is one of the best of its kind in the Naugatuck valley. It is as nearly fireproof as possible. Its floor, which is of cement, covered with heavy flooring, is 100 x 70 feet and absolutely free from pillars or any obstruction except the machines. It is well lighted throughout the daytime because of the four ribbed-glass walls of the building and at night from rows of incandescent lamps, controlled by separate switches so that as much light as is required may be had at any time. The frame of the building is steel and its roof is concrete. The ribbed glass walls are set into steel and concrete frames and the glass portion of the walls is eleven feet high. There are eighteen feet clearance from floor to trusses.

Water is supplied from wells on the grounds, pumped to a 1,000 gallon reservoir under the roof and distributed from there to the various portions of the factory. Hot water is supplied to all points, the water being heated at the muffles.

The principal motive power is supplied by a 35-h. p. motor and this drives the drawing machinery and saws. In the machinery room a 10 h. p. motor is used and 5 h. p.

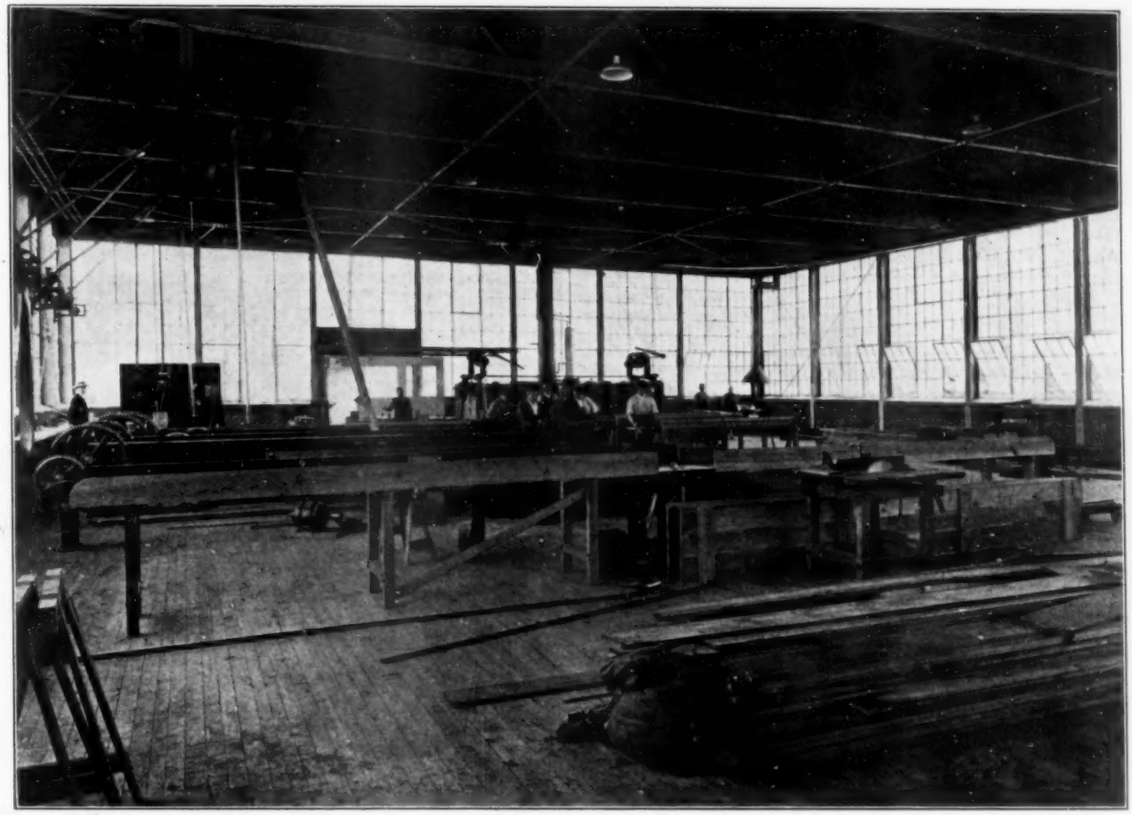


THE MACHINE ROOM OF THE NATIONAL COMPANY.



SHOWING THE STEEL LOCKERS AND SANITARY CLOSETS.

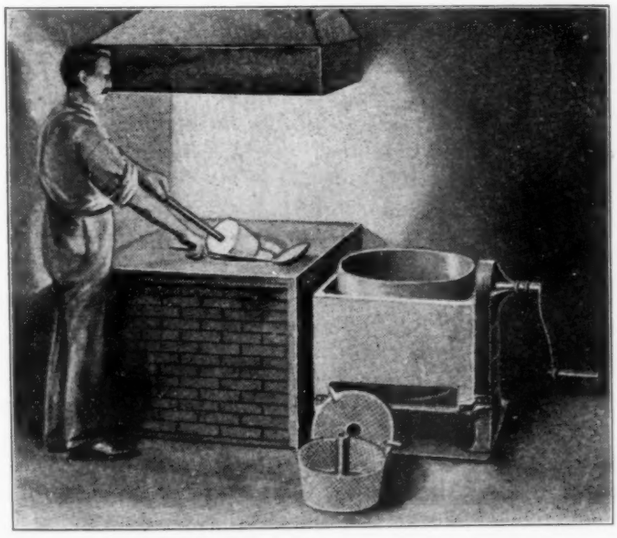
motors are used in other parts of the plant. One of the features of the machinery is the ball-bearing hanger which is attached to every pulley, reducing the friction to a minimum. Safety devices will be added to all the machinery as soon as possible. Sanitary toilets and steel lockers, one for each employe, have been installed and porcelain wash bowls, providing for the ready accommodation of all. Arthur A. Tanner, vice-president of the company is connected with the Waterbury Foundry Company while Mr. Byrne is a well known lawyer and former judge of probate. The company is represented in New York by L. M. Rogers, 291 Lincoln ave., Brooklyn, N. Y.



VIEW OF THE INTERIOR OF THE PLANT OF THE NATIONAL COMPANY AT WATERBURY, CONN. HERE ARE SHOWN THE WIRE AND TUBE DRAWING BENCHES WITH THE MUFFLES AND BLACKSMITH SHOP IN THE DISTANCE.

## CENTRIFUGAL SYSTEM OF TINNING

An improved method of tinning small articles is in use in several German factories, where the slow and unsatisfactory dipping method has been discarded. The device consists of a centrifugal machine driven either by hand or power, and the articles, after the usual preliminary treatment, are placed in quantities in a cylindrical tinning drum, the side wall of which is perforated. The whole is dipped in molten tin, and then placed in the centrifugal apparatus, and after one second of rapid turning, the articles are found to be evenly tinned, while the surplus is driven off, and is recovered as a ring-shaped crust on the outside wall of the drum.



CENTRIFUGAL FOR FINISHING TINNED ARTICLES.

### THE CORROSION OF ALUMINUM.

Recent researches prove that aluminum is subject to two kinds of corrosion: one of these resulting from a uniform attack all over the surface, while the other is localized in scales and spots. It is to be noted that the second case is generally produced upon metal which is mechanically worked by drawing or rolling. As in the case of iron, it seems that the metal must be exposed to air and dampness at the same time, for one alone will not produce it. Carbonic acid is a leading element in the corrosion. Worked aluminum scales off in the direction in which the mechanical action has been carried out.

# EDITORIAL

OLD SERIES. Vol. 20. No. 8. NEW YORK, AUGUST, 1914. NEW SERIES. Vol. 12. No. 8.


# THE METAL INDUSTRY

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THE ALUMINUM WORLD, COPPER AND BRASS,
THE BRASS FOUNDER AND FINISHER
AND ELECTRO-PLATERS' REVIEW.

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## CONTENTS



## WAR AND THE METAL INDUSTRY

Depressive effects of the war now raging in Europe on the American metal market are already manifest. There will be noted in our "Metal Price pages" a lack of current quotations. The copper producers have withheld production figures for July probably with a view of supporting the price as stocks on hand must be large. Probably between forty and fifty per cent. of the copper produced is exported, and with shipments refused for abroad as they are now, there naturally would be shown to have on hand an apparently enormous supply which domestic consumption will not begin to need at this time. Production will probably be, in fact has already been, curtailed so that figures for August, if issued, should show a general evening up.

The conditions regarding metals not produced in this country are, to say the least, bad. Tin has gone up in price so that only what is absolutely indispensable to every day wants will be used. The last quotation we hear before going to press is 65c., and only a small quantity is offered. Platinum is on the upward trend also, and possibly there will be such a rise in its price before matters in Europe quiet down as to curtail the use of the metal for jewelry purposes, which result will not be received with disfavor in those circles who think that platinum should be conserved to more serious ends. There are no quotations in silver, quicksilver and other metals that come from across the water. Now is the time for the metallurgist to rearrange his alloy list and discover mixtures, which, while having necessary physical characteristics, will dispense with tin.

In the metal finishing world there is considerable apprehension as to the future relating to lacquers and other finishing compounds that require fusel oil and amyl acetate for their make up. It seems as though now would be a good time for some of the distilleries to turn their attention to the exterior decoration of mankind rather than internal, and produce these products. If, as we understand, fusel oil may be made from potato starch, why should not this industry be encouraged and fusel oil become a staple of home industry?

While no country can ultimately benefit by any such world wide disorder as is now taking place, it is reasonable to suppose that some temporary, at least, increase in American manufactures will be noticed in the immediate future. Competition in certain lines of manufacture that has sprung up due to the tariff revision will for the moment disappear, and our manufacturers will of course take immediate advantage of the present conditions. Whether the benefits to the country at large from this source will be outweighed by stagnation and consequent losses in export business is a matter for the future

to determine. For general manufacturers, however, there seems to be one bright gleam of hope. This is in South American trade. With a total business last year of $1,000,000,000 done in South American countries, it seems as though all American manufacturers had to do was to go after it. This would be true if it were not for the unfortunate lack of American bottoms. The question of the American merchant marine is a serious one, and has never been more so than at present. Perhaps Congress can see a way out to enable America to not only secure the enormous trade knocking at her gates at the south, but also to furnish England with the tremendous quantities of food stuff which, should the war continue for an indefinite period, she will so surely need.

The Iron Age in an editorial says in this connection:

"As showing how much at sea business has been in the past week, we have had opposite answers to the all-important question, what effect the war will have upon our grain exports. It has been said that it will close Europe against them and that our farmers, in the midst of such plenty as they have never known, will not be able to turn their exportable surplus into money. But opposed is the quite reasonable view that the one thing Europe's warring millions must have is food, and that at any hazard the way will be kept open to get it.

"Already the effects of the suspension of exports in certain lines are seen, as in the oil trade, and in various manufactured products. Elsewhere these are referred to, as they have appeared in the steel and machinery trades. But overtopping all such disturbances are the ability of the 100,000,000 people of the United States to do business at home and their evident purpose to go about their business and not lose their heads. There is no occasion for anything like the measures which Europe has had to enforce as a protection against chaos."


## THE METAL DEALER

To the Editor of The Metal Industry:

In the June issue of The Metal Industry, there appeared two articles which were quite in contrast.

One was the report of the U. S. Geological Survey stating the value of the scrap metals recovered in 1913 to be $72,000,000 and on the same page an article* whose main import seemed to be that "all the honest metal dealers die young" and "constant vigilance is necessary to guard against the raw deals and tricks of the metal dealer." Surely a business of the magnitude of the scrap metal business cannot be founded upon dishonest methods such as the article would seem to infer. Most people, familiar with this line, know better, but there are a number who do not understand conditions and who might be prejudiced by statements of that nature appearing without contradiction. There are two sides to every question and this case is hardly an exception to the general rule. It is highly commendable to disclose any underhand work on the part of dealers and if this course was pursued to a greater extent by foundries and manufacturers a large part of the trouble might be eliminated.

Unfortunately there are a number of dealers whose reputations are not of the best and who deserve the reputations they have created for themselves. They are in the minority, however, and in most cases comprise the junk dealer with his horse and wagon and a small load of metal as his stock in trade rather than the metal dealers proper, who, in most cases, are houses of long standing with large resources and whose annual business runs into millions.

The Honorable Curtis Guild, ex-Governor of Massachusetts, in his address at the banquet of the National Association of Waste Material Dealers, held last year, stated: "As the savings banks have utilized waste capital, so your industry utilizing waste products has grown upward and outward till it ranks not merely with the leading lines of commerce in the United States, but occupies a most important position in our foreign trade. Look along the lines of your leading firms in the rating book of any commercial agency. You are members of no mean line of commercial industry. The turnover of one house after another rises above the million dollar mark and credit after credit is marked 'AA' unexceptional and not to be surpassed." Again, Mr. N. Levy, president of the Berlin Metal Exchange, who spoke at the last meeting of the National Association in New York: "Gentlemen, gigantic as are all things in this wonderful country is also your metal industry and your metal business. The American old metal trade is the biggest in the world. Nowhere are such immense quantities produced or can you trade in such big style." Does it seem plausible that a business of this magnitude should be handled by tricksters and grafters and others of their ilk?

An investigation would no doubt show the reason such people are engaged in the business to be due to the patronage and encouragement given him by the foundry and the manufacturer. Instead of buying from a reliable firm with a financial standing and a reputation for good packing, some foundries prefer to save money by buying their copper and brass at a cent a pound below the market from anybody, no matter what his record may be. This usually turns out to be a saving on the wrong side of the ledger, as the article published last month would seem to indicate. Let the foundryman or manufacturer investigate his own plant and see if everyone is above suspicion. There are a great many places where it is impossible to do business on a fair basis and every dealer can name concerns where they are unable to go and quote market prices without being ridiculed. An instance of this kind was forcibly stated in an article which appeared in the Waste Trade Journal entitled "Metal Trade Honesty."

"We have from time to time received inquiries from large producers of scrap metals, 'Why is it that we take no steps to free the scrap metal trade from the suspicion which surrounds it?'" They are of the opinion that in dealing with the scrap metal dealers it is necessary for them to exercise every suspicion and to take extraordinary precaution against being deceived. The opinion as above is a very general one, and by the producers is applied to practically every scrap metal concern, irrespective of the character and financial standing.

In answer to these inquiries we can with pleasure announce that the process of eliminating the evils of the scrap metal trade has already begun, but we at the same time regret to say that the progress of this improvement is hampered a great deal by the necessity which exists for a general housecleaning in the methods followed by the producers of scrap metal in disposing of their material. If the producer was only to cast part of his suspicion and mistrust upon his people or department in charge of selling the scrap metal, the opportunities for the scrap metal dealers to practice fraud would undoubtedly be so reduced as to make it an easier matter for carrying out the reforms they advocate.

When producers of scrap metal realize that the material has a standard market value, and if a dealer offers him a price above the market, he will then understand that no profit can accrue to the dealer unless unfair and illegitimate methods are used, thereby eliminating the honest scrap metal dealer from fair competition.

As an illustration let us refer to the recent failure of the A. Shanbrom Company, of Detroit, Mich., dealers in scrap metals. After operating in the East and establishing a record there which was anything but enviable, this corporation opened

*Buying and Selling Brass Foundry Scrap—W. H. Parry.

a small warehouse in Detroit, with an actual capital of probably no more than $1,000. Notwithstanding the fact that very few metal dealers would extend it any credit, we find that after doing business for only about a year the A. Shanbrom Company went into bankruptcy with liabilities of $30,000 and owing to the United States Motor Company about $25,000.

Isn't it strange that in a city like Detroit, with any number of responsible scrap metal concerns, whose ratings range anywhere from $50,000 to $300,000, the A. Shanbrom Company should be able to secure the business from a subsidiary plant of the United States Motor Company? We might even ask, isn't it strange that A. Shanbrom Company was in a position to pay more money for the scrap metal than the other concerns in the city offered to pay? And yet these other scrap metal dealers could purchase the identical stuff from the A. Shanbrom Company at its market value after the latter purchased it from the producers at higher prices.

Before A. Shanbrom Company located itself in Detroit, Mich., the automobile concerns sold their scrap to different scrap metal dealers at the regular market prices and immediately after the A. Shanbrom Company began its operations the subsidiary of the United States Motor Company received instructions from the New York office that all of their scrap material was to be turned over to the A. Shanbrom Company. It is strange to conceive why the United States Motor Company so willingly extended credit to the Shanbrom Company. We wish to leave it to our readers to pass judgment as to what factor gained for the Shanbrom Company the influence it had with the United States Motor Company.

Such methods existing today hold legitimate scrap metal dealers in disrepute and it is as much the manufacturer's fault as it is the dealer's. When the manufacturer will co-operate with the straight-forward concerns in this business, and when he will view with suspicion an offer of 15 cents for copper when it is only worth 14 cents, then only will he be rendering the proper aid towards eradicating the evils that he so frequently denounces. Why not pull together and try to eliminate some of the bad actors who are harmful to both trades alike? The National Association of Waste Material Dealers stands ready to co-operate with the manufacturer prosecuting such people wherever conclusive evidence of wrongdoing can be obtained.

CLARENCE B. WHITE,
Chairman Metal Division, National Association Waste Material Dealers.

Philadelphia, Pa., August 3, 1914.

## SCRAP METAL AND HONESTY

TO THE EDITOR OF THE METAL INDUSTRY:

The article of W. H. Parry, of the National Meter Company, in the June issue of THE METAL INDUSTRY, has just been brought to my attention. We wield no cudgel in defense of metal crooks, and it has been agonizing to us to know that the trade has many of them. Many a deal were we debarred from because of better offers made by such people. I have various parties in mind who I think would better be in jail than doing a metal business and polluting the channels of trade. But thank heaven that criminal class is lessening in the melting pot of American education and by the sons of such who may take up the work of their elders, the metal trade is being purified. So much for the metal dealers.

Now for the other side. We are constantly harassed by petty thieves, young boys, each with a knife in his pocket, who, at the first opportunity, slash open a bag-covered barrel, happening to stand on the sidewalk, and steal all they can. In a few minutes they have the coin for their pilferings. Were they not able to dispose of the metal, they would not go to the trouble of stealing it. But that is the "casus belli." The metal trade contains scoundrels. Often they are connived at by disloyal and dishonest employes of the manufacturers who sell their waste material to Tom, Dick and Harry. Were is not for such, there would be less crookedness. So much for that.

Now comes the poor, honest, innocent brass foundry man, who has brass skimmings and brass grindings for sale. The writer but very recently was the victim of one of those poor, honest, reputable brass founders, who salted his mine. In other words, 75 per cent. of the brass grindings were core sand. That saintly brass founder certainly could give cards and spades to the crookedest of metal crooks. Instances are numerous. Why do not the manufacturers protect themselves by a system of checks and other cautionary devices? In watching these crooks, why do they not also watch their own household, and when they catch a crook, why do they not, as is their duty to society, prosecute them to the bitter end of the law?

SALI B. MOERS.

New York, August 3, 1914.

## ELECTRIC CURRENT CONTROL

TO THE EDITOR OF THE METAL INDUSTRY:

I have read with interest the article* in your June issue by Mr. F. A. Rojas, describing a new device for reducing amperes while the voltage remains constant. He states the present way of adjusting the amperes is accomplished by varying the voltage and in the "new" system he regulates the amperes by varying the resistance. Most of your readers know that the usual method of regulating the current passing in a vat is by means of a variable resistance connected in series with it. Certainly this resistance reduces the voltage applied at the bath terminals (by an amount equal to the current passing, multiplied by the value expressed in ohms of the resistance inserted), and therefore the current passed through the vat is reduced. The "new" system claims to reduce the current by varying the resistance also, but as no external resistance is used, it is obvious that resistance is inserted in the vat itself in the form of an anode shield, even then, with amall loads your contributor finds it necessary to use a switch for cutting on, or out, an additional wire resistance.

I should be glad to see Mr. Rojas prove on paper the basis on which he claims that none of the current is wasted by using the "new" system, as compared with the usual method, because after all, one only pays for the actual watts taken from the dynamo, and (taking the example given) by the old method the current would easily be reduced from 20 to 4 amps., thus taking an actual load off the dynamo of 32 watts (8 volt x 4 amps. passing) and in the "new" method the results appear to be the same, but obtained by increasing the resistance between anode and cathode. Again the cost of such a method against the usual rheostat combined with the trouble of removing anodes when necessary, and the difficulty of manufacturing it in suitable material for different solutions, in my opinion, puts it out of the range of practical plating. Shielding of the anode has been a plater's trick for years.

GEORGE A. POPE.

Birmingham, England, July 29, 1914.

*The Control of Physical Conditions in Electrolytes.

## NEW BOOKS

**"BRASS FURNACE PRACTICE—BULLETIN NO. 73." By H. W. Gillett. Size 6 x 9¼ inches. 300 pages. Bound in paper. Published by the United States Bureau of Mines, Department of the Interior.**

The Bureau of Mines, in issuing this work, has made a wonderful advance in the interest of the brass founder. The bulletin is most complete and contains references to practically all of the information relating to metal melting processes that has ever been published in this country. Dr. H. W. Gillett, alloy chemist of the Bureau of Mines, who compiles the bulletin, has gathered the practical information embodied in the book from replies to 1,650 letters which he sent out, so that it may be fairly assumed that the figures given in the book represent the best practice in the United States.

The important plants engaged in the non-ferrous alloy industry opened their doors freely to the employees of the Bureau of Mines during the progress of the investigation, and the written data furnished were supplemented by personal visits which Dr. Gillett made to eighty foundries and rolling mills, in thirteen States. Information was given freely, and it is hoped that the results of the investigation will be of much value to the whole industry.

This bulletin is obtainable by anyone interested, as long as the supply lasts, on application to the Bureau of Mines, Department of the Interior, Bulletin 73, and we recommend that every foundryman should have a copy of this bulletin on his desk.


# Shop Problems


**IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.**

## ALLOYING

Q.—We understand that a new aluminum alloy has recently been introduced, particularly for pistons, connecting rods, and other working parts of air craft machinery. This metal is stated to be lighter than aluminum, non-corrosive and has a tensile strength of 25,000 lbs.

A.—You no doubt refer to the alloy known as Magnalium which has a tensile strength of 20,000 to 28,000. An engine with Magnalium pistons is not liable to pre-ignition troubles on account of the high heat conductivity value of Magnalium. It is also a good bearing metal. It is a rather difficult metal to handle in the foundry and must be melted without oxidation or it will be very brittle instead of tough.—J. L. J. Problem 2,008.

---

Q.—Kindly give us the formula for white metal and also for Coffin metal.

A.—The following is a good white metal for metal patterns and similar work:

| | |
|---|---|
| Lead | 80 per cent. |
| Antimony | 10 per cent. |
| Tin | 10 per cent. |

Coffin metal is another name for antimonial lead. Perhaps the most satisfactory formula is the following.

| | |
|---|---|
| Lead | 87 per cent. |
| Antimony | 13 per cent. |

This metal casts well, can be plated and has considerable strength.—J. L. J. Problem 2,009.

## CASTING

Q. We desire to cast some motor bearings, consisting of a cast-iron shell, containing a bronze bushing to be about ¼-inch thick. Is there any special treatment given the inside of the cast iron shell to make the bronze bushing adhere closely to the iron?

A.—The cast iron shell should be tinned and then heated to about the melting point of tin. Next pour in the bronze which should be sufficiently thick in section to run well, say ¾ of an inch or one inch and poured around a dry sound core. The bronze lining may then be machined to size. If a soft bearing bronze like plastic is used the bearing can be brooched when a little over size and a fine surface thus obtained.—J. L. J. Problem 2,010.

## COATING

Q.—We have an inquiry for lead coated gray iron castings. We can make the castings but the information we desire is what flux or preparation is necessary to make the lead adhere to the castings. We are operating a hot galvanizing plant and believe that we will not need much of an equipment to coat castings with lead.

A.—The same flux, viz.: Chloride of zinc, that is used in hot galvanizing on gray iron will answer for lead coating. You may also use sal-ammoniac or chloride of zinc on the top of the lead bath, as the small amount of zinc that might be reduced and added to the bath, in case you use the chloride of zinc as a flux, would not do any harm. The same apparatus may be used for lead as you use for zinc.—K. Problem 2,011.

## DEPOSITING

Q.—Will you kindly advise me how to silver deposit on celluloid?

A.—Paint the design upon the celluloid with plater's copper bronze powder mixed with Berry Brothers' (New York City) gold size to a fluid paint. After painting the surface should stand until thoroughly dry and hard.

Now prepare a solution consisting of ½ ounce of silver cyanide and ¾ ounces of cyanide per gallon of water. Immerse the celluloid painted surface in the silver dip until it becomes white, due to a very light coating of silver. Wash in cold water and plate in a regular acid copper bath until a sufficient coating of copper is produced. Afterwards the surface may be silver plating or gilded or any other finish may be applied in the regular manner.

The acid copper solution should consist of the following proportions:

| | |
|---|---|
| Water | 1 gallon |
| Sulphate of copper | 1¾ pounds |
| Sulphuric acid | 4 ounces |
| Black molasses | ½ ounce |
| Voltage | ½ to 1½ volts |

C. H. P. Problem 2,012.

## FINISHING

Q.—We manufacture boxes made of copper and sheet zinc. The boxes are double seamed and soldered and we coat them with a liquid celluloid material. Before coating them, the surface must be absolutely clean and roughened so that the finish will stick to the surface without peeling, flaking or chipping.

What we would like to know, is the best method of roughening the metal to make the finish stick. Is there any solution that they can be dipped in without affecting the solder that will clean and roughen the metal so that the finish will stick and not peel, chip or flake off? The sheet metal is flexible and, therefore, an elastic coating like we are putting on is necessary to get the desired results.

A.—The only method that can be used in producing a rough surface satisfactory for your purpose is sand blasting. Any chemical method would not be practical owing to the reducing action that would develop upon the copper or zinc used in the manufacture of the boxes.

We might suggest the application of a thin coating of a turpentine varnish such as a gold size or copal varnish to the metal surface first, and when this becomes dry and hard apply your regular coating of liquid celluloid as the celluloid liquid would have no dissolving action upon the turpentine varnish.—C. H. P. Problem 2,013.

## MELTING

Q.—We should be glad if you could tell us how to prevent silver castings becoming pin-holey. We may say that we face the moulds with charcoal facing, dry them hard, and before pouring we use a small amount of phosphorus to clear the silver. We believe that much of the trouble is caused through using silver which has been melted many times before, but should be glad to hear your reasons.

A.—During the melting operation silver is especially liable to occlude or absorb gases. While the metal is cooling in the mold, these gases are released producing pin holes in the castings. For this reason silver should be well protected during melting. While charcoal is a good cover, sugar is much better, because it forms a hard mass of coke on the surface of the molten silver. Thorough venting of the molds is necessary and the sand should be of an open nature. The use of a deoxidizer for silver is now quite common, the following mixture being recommended: silver, 925 parts; manganese, 25 parts; silver, 925 parts; copper, 70 parts; cadmium, 5 parts. An alloy of 20 per cent. manganese-zinc is also used.—J. L. J Problem 2,014.

## MIXING

Q.—Some years ago we made for a manufacturer considerable quantities of saddle horns in brass and in a white metal composition which they called "Sterling metal." They had no standard formula for this latter composition, and while we made satisfactory horns in brass we fell down finally on the "Sterling metal" castings, or, rather we gave up trying to find a satisfactory mixture by experimentation. We now have an opportunity again to figure on this work. Can you give us a formula for making these castings. The metal must have considerable strength, and must polish up to a silvery appearance without the danger of quick oxidation after it is put into the saddle, since the white metal horns are not covered with leather.

A.—The following mixture may be used for the saddle horns.

| | |
|---|---|
| Copper | 59½ parts |
| Nickel | 15 parts |
| Zinc | 25 parts |
| Aluminum | ¼ part |
| Manganese Copper 30% | ¼ part |

The articles may be finished by silver plating if so desired.—J. L. J. Problem 2,015.

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Q.—What composition is best for screen plates used in paper manufacture which will resist corrosion? Are these plates cast or rolled? If rolled, please state whether cold or hot.

A.—Screen plates as used in the manufacture of paper are of two classes; one, known as low brass, has a composition of 80 parts of copper, 17 parts of zinc, and 3 parts of lead. The second class: copper, 66 to 68 parts; zinc, 29 to 31 parts, and lead 3 parts. The latter composition is the one most generally used.

Screen plates are invariably cast in iron moulds and rolled cold.—K. Problem 2,016.

## PLATING

Q.—As we have too much boracic acid in our nickel solution, will you kindly inform us how to remove some of it from the solution? The plated goods turn black and then peel.

A.—You cannot remove the boracic acid from the bath. The only method to pursue is to neutralize the excess; this can be accomplished by adding carbonate of nickel or water ammonia. The ammonia will probably be the best material to use. Add ½ ounce (26 per cent.) to each gallon and try out; if the bath shows an improvement a little more may be added.

An excess of boracic acid is of no value to a nickel bath, nor an excess of any other acid. A small amount is of value because a nickel bath that is faintly acid produces a whiter deposit.

If sulphate of nickel and sal ammoniac is added to the nickel bath when the color becomes dark in the proportion of 2 ounces of the nickel salt and 1 to 2 ounces of the sal ammoniac, it will not be necessary to add boracic acid or sulphuric acid at any time.—C. H. P. Problem 2,017.

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Q.—I would like a formula for an acid copper solution for deposit work. I made up a vat of 265 gallons of this solution, in which I used one pound and a half of bluestone to one gallon of water, sulphuric acid one ounce to every fifteen gallons. I was going to put one ounce of black molasses to every twenty gallons, but was advised not to, as it did not give any better result. Can you advise me what to do?

A.—The trouble with your sulphate of copper solution is that it does not contain enough free acid. One ounce to the gallon is the correct amount to use. Black molasses has been found to be very satisfactory material to use to produce a ductile deposit. Many platers have adopted this material as an additional agent in acid copper baths.—C. H. P. Problem 2,018.

## POLISHING

Q.—Why is emery cloth objectionable for polishing a dynamo?

A.—Emery is objectionable around a dynamo because the loosened grains are likely to get into its bearings and start cutting. It is best to use a fine grain of sand paper, as the loose flint from same is much less likely to cut up the bearings and it takes a better hold when you are using it. The armature should never be cleaned as long as you are getting the proper current and no sparks flying from it.—P. W. B. Problem 2,019.

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Q.—Will you please inform me how to polish hard rubber to a buff or gloss finish?

A.—Hard rubber may be highly polished by the use of rotten stone and oil.—P. W. B. Problem 2,020.

## RECLAIMING

Q.—We would like to know if there is some good practical method of recovering the grindings from brass castings each day. We grind about 400 pounds of brass castings per day. Our buffing lathes are connected with an exhaust fan and the grindings are blown into a small iron shed where the air escapes leaving the refuse. We grind off about 4½ pounds from 100 pounds of castings.

A.—For the small amount of grindings you have the best practice would be to make an assay for copper and when a sufficient amount of the grindings had accumulated, dispose of them to a copper smelter on the basis of the assay.—J. L. J. Problem 2,021.

## REMELTING

Q.—We are finding it very difficult to make a satisfactory casting out of the composition of 85% copper and 15% zinc, which is scrap metal already mixed and we are simply remelting it. The castings come out of the mould with a greenish white coating and with smoke holes. Can you suggest a remedy for this condition?

A.—It is likely that the castings are being taken from the molds too soon. Try leaving them in the sand longer and see if it does not give a good red color. Of course, if scrap brass has been used that is full of iron, aluminum, etc., a good color cannot be had. It is not probable that the sand has caused the trouble.—J. L. J. Problem 2,022.

## RUSTING

Q.—I am at present using a bath consisting of white lead dissolved in benzine with a small proportion of lamp black and boiled linseed oil, for putting a priming coat on steel sheets I have manufactured to keep them from rusting. If, instead of white lead I substituted zinc, which is considerably cheaper than white lead, will it protect the steel as well as the white lead? Should you know of any mixture that would protect the steel better than what I am using and be cheaper, I would be glad to have a description of the same.

A.—Your bath should protect the steel sheets just as well even if you substituted zinc oxide for the white lead. A paint made with white lead has more covering power, however, than one made with zinc oxide. The linseed oil is really the ingredient that protects the steel.—J. L. J. Problem 2,023.

## SOLDERING

Q.—We are having considerable trouble with the soldering acid that we are using at present. The acid corrodes the metal parts previous to electro plating and rusts the parts so badly that they require refinishing by brush and emery before plating.

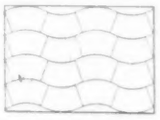
A.—To make a non-acid soldering fluid which will prove satisfactory and give good results proceed as follows: In a suitable container place ½ gallon hydrochloric acid and add scraps of sheet zinc until no more will dissolve; then add one quart of alcohol and one quart of glycerine. In a second vessel or container dissolve one pound of sal ammoniac in a pint of water and afterwards mix the two solutions. Test the resulting solution with blue litmus paper, and if still acid add a small amount of carbonate of zinc and mix well. When properly proportioned the fluid will be absolutely free from acid and will be non-corrosive.—P. W. B. Problem 2,024.

# PATENTS

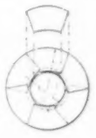
**REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.**

1,096,631. May 12, 1914. **Method of Making Wheels.** Albert Kortum, Buffalo, N. Y. Assignor of one-fourth to G. F. Meyrs, Buffalo, N. Y.

This invention relates to buffing, polishing or cleaning wheels, and has for one of its objects the making of the same with a minimum amount of waste of the textile or other material, as shown in cut.



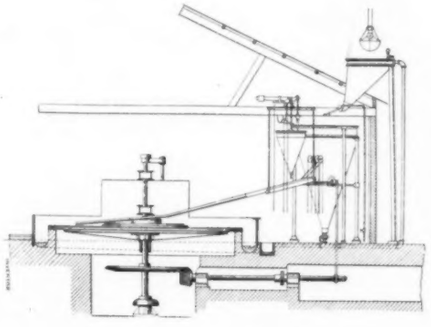
The inventor claims a method for manufacturing a wheel for the purpose specified, comprising cutting flexible material into sinuous bands bounded on both sides by a plurality of parallel reversed tangential arcs of a circle of substantially the same curvature as that of the outer periphery of the wheel, cutting the said bands into sections across the said arcs at an angle to the perpendicular, the prolongations on the right and left hand sides thereof converging to a center eccentric to the center of the wheel, placing the said sections in a circle overlapping each other, and finally fastening the same together.



1,099,366. June 9, 1914. **Method of Applying Abrasives to Grinding Apparatus.** H. K. Hitchcock, of Tarentum, Pa.

This invention relates to a method of handling sand or other abrading material for use with grinding machines, such as used in the grinding and smoothing of plate glass.

The object of the invention is to simplify the handling of the material and delivery of the same to the grinding machine mixed with water.



The purpose of the present invention is to facilitate the handling of sand and similar abrading material under general conditions and in a manner to permit it to be carried to the place of use by clam shell buckets or other mechanical means, as shown in the cut, and deposited from overhead into a suitable hopper, from which it is delivered in a continuous stream mixed with liquid, in which condition it can either go directly to the grinding table or to suitable grading apparatus.

1,102,618. July 7, 1914. **Metal Alloy.** Samuel Wein, New York, N. Y. Assignor to Jerome H. Strauss, trustee.

This invention relates to metallic alloys, particularly alloys of aluminum.

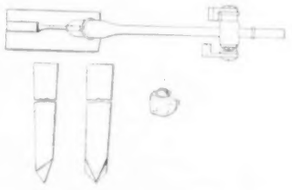
The inventor has discovered that by adding a combining agent which enters into combination with the aluminum and zinc he is enabled to produce an aluminum-zinc alloy which combines all of the advantageous properties above set forth without the defects. This combining agent is the metal tellurium in small proportion to the aluminum and zinc, preferably from ¼ to 1 per cent. In making the alloy the aluminum is first preferably melted, then the proper proportion of zinc is added until the two are fused together to a homogeneous mass. The tellurium is then inserted into the mixture, preferably with suitable tongs, or other instrument, to deposit the same at the bottom of the crucible and permit the same to transfuse through the entire body of metal. The proportion of the various metals may be varied, the aluminum varying from 50 to 85 parts, the zinc from 49 down to 14 parts, and the tellurium from ¼ to 1 part. The various proportions are to secure various degrees of hardness and toughness of the alloy, depending upon the character of its use. The tensile strength may run up as high as 48,000 pounds per square inch, and the torsional strength as high as 60,000 pounds per square inch.

The improved alloy may be rolled into sheets and drawn into wire, and when suitably annealed may be rendered sufficiently tough to be bent back on itself without fracturing. Castings as well as forgings may be made with equal ease, the metal flowing freely when cast hot or when subjected to pressure or impact when cold. The alloy is readily soldered, and a joint may be obtained which is as strong as or stronger than the body of the metal. A beautiful polish may be imparted to the surface of the alloy, and the same may be left for a long time in the atmosphere without substantial oxidation. It is suitable for electrical purposes, as it has a high electrical conductivity.

1,099,957. June 16, 1914. **Soldering Tool.** Charles Wilmot, Smethwick, England.

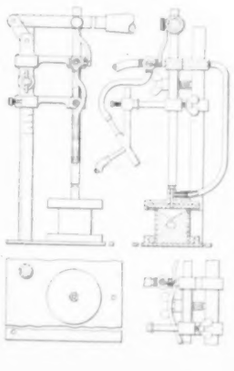
This invention has reference to blow pipes for use in soldering aluminum and comprises an improvement in or connected with the same whereby the soldering process is considerably facilitated.

According to this invention the nozzle end of the blow pipe, as shown in cut, is provided with and has fixed to it a short tool which is called a conducting scraper, as said tool is adapted to serve the two purposes of scraping the surface of the aluminum where the solder is to be applied and simultaneously leading the solder along the same as it is melted by the blow pipe. The acting end of the conducting scraper is made of various forms according to the particular surface, whether flat, angle shaped or curved, to which the solder is to be applied.



1,101,816. June 30, 1914. **Apparatus for Casting Metals and the Like.** C. W. Seymour, Christchurch, New Zealand.

This invention relates to apparatus used for casting metals and more particularly for dental castings or castings required by jewelers and provides means whereby such castings can be produced in a more expeditious manner than heretofore.



The invention shown in cut consists in mechanism wherein adjustment of the various parts to suit different sizes of cylinders used for casting can be performed in one operation; and in improved means for admitting compressed air to the top of such cylinder for forcing the metal into the mold.

With the apparatus at present employed the element of chance is not eliminated, and great care is

necessary to insure good results, but by this invention the best results are said to be obtained with a minimum of risk.

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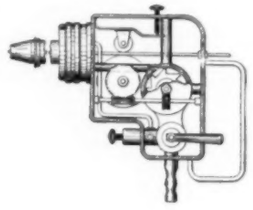
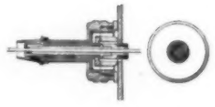
1,100,602. June 16, 1914. **Apparatus for Melting and Projecting Fusible Substances.** Erika Morf, Zurich, Switzerland.

The object of this invention is to provide an improved apparatus or appliance whereby a fusible substance, as, for example, a metal wire, may be melted and then projected in a molten state against a surface for the purpose of providing same with a fixed or detachable coating, the appliance being either portable or stationary, as most convenient for the work to be performed.



An embodiment of the invention is shown in section in the accompanying drawing.



The plant covers: In a fusing and projecting apparatus, means to produce fusing heat, an air blast associated with the said mains to project the fused material, and means for feeding the fusible material to a position to be subjected to the influence of the fusing means and air blast.

In a fusing and projecting apparatus, a nozzle, a combined fusing and air blast device associated with said nozzle, and means for feeding fusible material to a position to be fused and projected by the said combined device.

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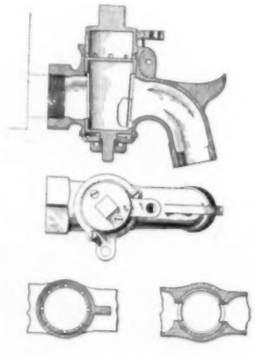
1,100,787. June 23, 1914. **Lubricating Valve for Fuel Oil Tanks.** William H. Smith, of Cleveland, Ohio, assignor to Cleveland Bronze and Brass Works, of Cleveland, Ohio, a partnership consisting of William H. Smith and Michael F. Barrett.

This invention relates to valves, and has for its particular object the provision of a valve or cock of the turning-plug type that shall be particularly suitable for use in connection with gasolene tanks. This particular suitability is attained by reason of a continuous supply to the operating parts of the valve of a lubricating fluid of greater consistency and specific gravity than the gasolene, whereby the leakage of the gasolene around the valve surfaces will be impeded and whereby such gasolene as may escape will be floated into a chamber or reservoir prepared for its reception and prevented from dripping from the valve in an unpleasant and dangerous manner. The means whereby these objects are attained, together with other features of construction and operation of the improved valve, constitute the present invention and are shown in the cut.



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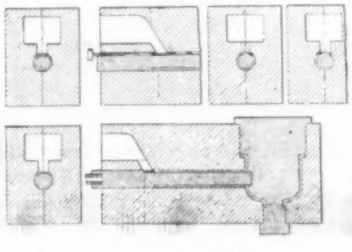
1,103,039. July 14, 1914. **Means for Pouring Metal in Core-Molds.** F. E. Cudell, Cleveland, Ohio.

The invention here explained relates to a process and the means for pouring metal into core-molds. The object is to prevent defective castings. The drawing exemplifies a mold-form having a long upright extension in the shape of a tube. It will be readily appreciated that chilled particles such as have been suggested will frequently occasion serious defects over the thin areas of such a tube casting.



The invention consists of an arrangement for pouring molten metal into core-molds so that the metal stream on leaving the gate falls directly down a vertical passage which may be proportioned as desired with respect to the size of the gate. More specifically a guide or partition is provided on each side of as well as above the gate so that the flow of metal is confined to a single stream in which the oxidation must be considerably lessened. In this manner also, the advantage is secured of avoiding sprays and drops, which, when occasioned, become chilled and lodge between the mold and the core to form defects in the casting when the rising metal eventually envelops them.

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1,103,482. July 14, 1914. **Alloy for Welding Copper and Nickel.** Carl Canzler and Richard Samesreuther, of Düren, Germany. Assignors to Autogenwerk Sirius, Gesellschaft mit Beschränkter Haftung, of Dusseldorf, Germany, a firm.

Hitherto in welding copper phosphorus was generally employed as a reducing agent for preventing an oxidation of the copper. This phosphorus was applied to the welding either in form of phosphorus copper wire or of a phosphorus powder, which was strewn on the joint during the welding operation. The results obtained were, however, not satisfactory as regards the quality of the welded joint. With the object of obtaining better results, a copper wire has in recent times been used, which contained, beside the phosphorus, also tin and zinc at varying percentages. But neither by such means an absolutely perfect welded joint was obtainable; on the contrary, the joint is generally brittle and does therefore nôt allow of being conveniently worked.

According to the present invention a copper wire shall be used for such welding operations, which contains besides the amount of phosphorus necessary for the welding operation, also silver in quantities up to five per cent. In place of the silver, cadmium, bismuth, or an alloy of any or all of these metals may be employed, the cadmium, silver and alloys being an equivalent of the silver for the purposes of this invention. The joints welded with such a binding agent or alloy of copper and silver show an extraordinary strength and elasticity. The welded joints may be worked in a heated condition. The alloy may be also employed in the same manner for welding nickel, which is an equivalent of copper, for the purposes of this invention.

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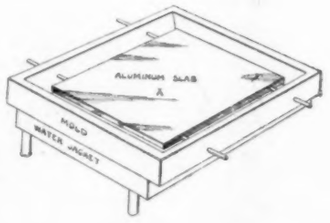
1,101,219. June 23, 1914. **Composite Metal.** L. B. Tibbetts, 2d, St. Louis, Mo.

The invention relates to a composite metal suitable for use in the manufacture of inexpensive toilet ware, such as brush backs, hand mirror frames, and the like, and other articles of merchandise commonly made of Britannia metal.


The invention has for its object the production of a composite metal that may be used in lieu of Britannia metal as ordinarily made, and which has incident thereto advantages as compared to Britannia metal, comprising cheapness, lightness, strength, rigidity and elasticity.




The composite metal includes two outer layers of Britannia metal, as shown in the cut, and an intermediate layer, or core layer, of aluminum, the core layer of aluminum being preferably approximately pure, so that it contains little, if any, foreign substance. The two outer layers of Britannia metal, with the aluminum core between them, are permanently joined to each other, thereby producing a multiple-ply structure, in which each of the layers of Britannia metal serves as a face, while the layer of aluminum between them affords a backing for each facing layer.

The Britannia metal preferably used in making the composite metal comprises from 88 per cent. to 96 per cent. tin, from 4 per cent. to 9 per cent. antimony, 1 per cent. to 4 per cent. copper.

# EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

## DIE MOULDED CASTINGS

The accompanying photographs show the factory installation and some of the die moulded castings made by the Stewart Vacuum Process, operated by the J. K. Stewart Manufacturing Company, Chicago, Ill.

FACTORY AND GENERAL OFFICES OF THE J. K. STEWART MANUFACTURING COMPANY.

These particular castings were selected to show how practical it is to produce, with this process, intricate, irregular and difficult parts with any number of holes cast and tapped simultaneously. It is claimed that the Stewart Vacuum Process has the decided advantage over other methods of excluding air from direct contact with the metal, thus preventing oxidization and insuring a perfectly homogeneous, or close-grained casting. The importance of this feature will be fully realized by those who have had experience with die castings more or less honeycombed with air-holes. The use of die moulded castings is not as general as their many advantages warrant. The elimination of machine work, thus reducing the manufacturing space required, smaller payrolls and overhead charges, means smaller production costs. In these days of keen competition, when every manufacturer is trying to effect every economy, a solution may often be found by taking advantage of die castings.

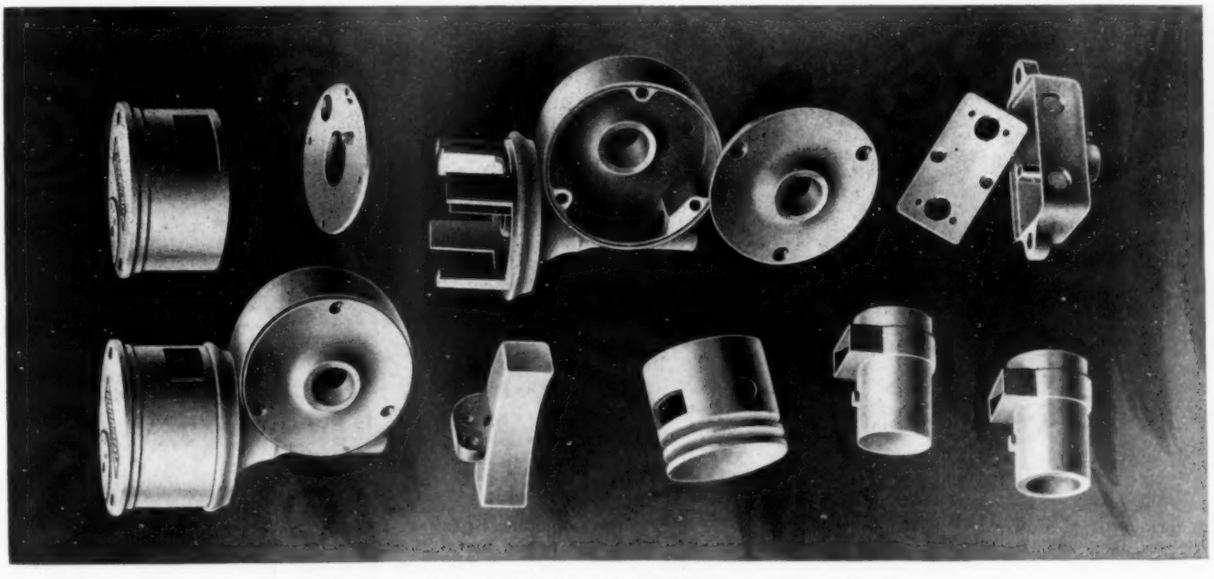
The casting machines used by this company are built from their own design and in their own factory and are entirely automatic in operation, thus giving the company a decided advantage in the matter of labor costs. The metal composition used in the Stewart process are classed into four groups, each one containing several mixtures to suit a variety of purposes. The following are illustrations of the most widely used mixtures in each group:

Stewart No. 1 White Bronze.—Main body zinc, but heavily alloyed with copper and tin. The strongest die cast metal known, and while somewhat below the tensile strength of high-grade brass, takes the place of it in the majority of instances.

Stewart Acid-Proof Metal.—Main body tin, alloyed with copper and antimony. Is used in soda fountain parts, cream separators, pumps, etc., and also for numbering wheels and other high-grade work.

Stewart No. 1 Type Metal.—Main body lead, hardened with antimony and tin. Is used for centrifugal governor weights and similar work, where no particular strength is necessary, and where weight is a factor.

Stewart Genuine Babbitt.—Main body tin, alloyed with antimony, lead and copper. Used for high-grade bearings, because of its anti-frictional qualities.



SOME CASTINGS MADE BY THE STEWART VACUUM PROCESS.

Most of these metals can readily be plated or enameled in any finish desired.

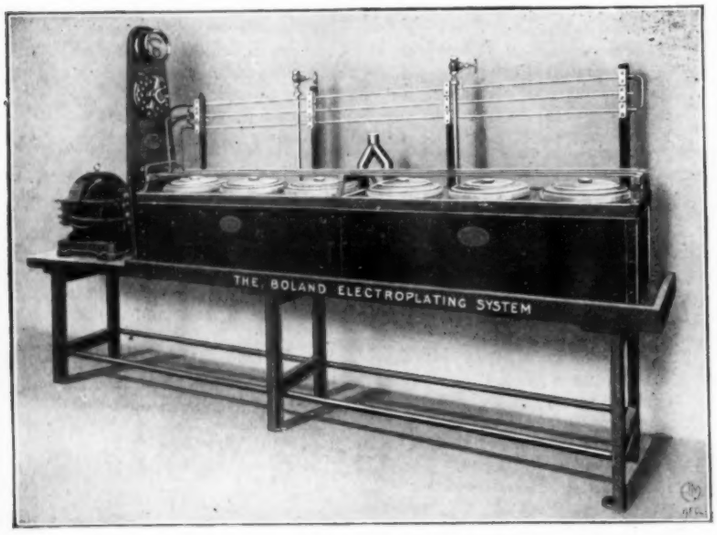
The metallurgical department of this company is controlled by the chemical laboratory, which analyzes all metals before they are compounded into alloys. By this system a high standard of purity in the compositions is readily maintained. The chemical department has also charge of the research work in connection with new alloys and special compositions, and the Stewart company is anxious for their customers to consult with this department free of charge.

## PLATING EQUIPMENT

The electro-plating system which is shown in the accompanying cut is only a part of the equipment for the requirements of the manufacturing jeweler which has been made a special study of by the Holtzer-Cabot Electric Company, of Brookline, Boston, Mass., and Chicago, Ill. The particular system shown in the cut was designed by P. J. Boland, and constitutes a complete electro-plating system, and attention is directed to the location of the low voltage dynamo, its field rheostat and voltmeter with reference to the plating tanks.

A plating system arranged in this manner must necessarily occupy a minimum amount of space, it is self-contained and entire equipment is within easy access of the operator.

The Holtzer-Cabot Electric Company has in its employ a corps




A SELF-CONTAINED ELECTRO-PLATING SYSTEM.

of engineers who have given for years careful study to the needs of the manufacturing jeweler as regards electro-plating apparatus. Among the very interesting things which the company have described and illustrated in their new catalog are a special drive for a polishing bench. The bench is fitted with individual buffing heads each of which is independent and under perfect control. A portable polishing bench which makes a convenient and economical device for a large manufacturer in overtime work, or for polishing a small quantity of work during a shutdown, is also illustrated and described. Individual electric heads for scratch brushing and hot blast drying apparatus, together with positive pressure blowers, lap wheels, bench drills and plating-dynamos go to make up very interesting reading in this catalog, which may be obtained upon request and is entitled Electricity in the Manufacture of Jewelry.

## BRONZE BEARINGS WITHOUT BABBITT

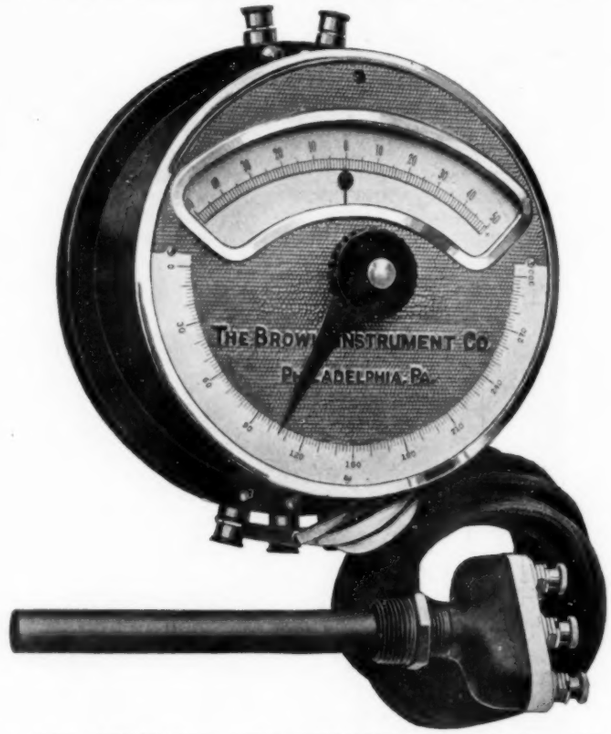
The American Metal Company, Pittsburgh, which recently completed a new plant at Wilkinsburg, Pa., has been conducting a number of tests to determine the efficiency of bronze journal bearings composed of 65 per cent. copper, 30 per cent. lead and 5 per cent. tin, treated in crucibles. They are solid bronze castings requiring no babbitt surface. In a test for the Baltimore & Ohio Railroad, a 22-pound bearing was placed under the tender of a Pacific type locomotive. After the engine had run 51,000 miles an examination showed that it had worn 1/32 inch, and it was said without becoming heated at any time. Other bearings on the tender were rebabbitted six times each, according to the shop superintendent in charge of the locomotive.

For mill purposes the bronze may be hardened. A test of this nature was made at the Soho works of the Jones & Laughlin Steel Company, Pittsburgh, where two 75-pound brasses were used under the rolling table of an 108-inch plate mill, the minimum weight of which is estimated at 10,000 pounds. The superintendent of the mill stated that the two brasses gave continuous service for four weeks, or twice as long as the ordinary phosphorus bronze bearing. On account of the position of the bearings, it was impossible to lubricate them during the test. Graphite in the lead acts as lubricant, it is stated, making the metal practically frictionless and reducing the amount of the lubricant required.

The plant of the American Metal Company is very similar to that of the ordinary brass foundry. Four furnaces of concrete and fire-brick construction have been built at one end of the foundry building, 40 x 90 feet. A chain hoist is used to carry the molten metal, by means of a trolley, to the molding floor at the opposite end of the plant, where the bearings are cast in the usual manner. After the gates have been sawed off the bearings are polished on an abrasive wheel and then machined on lathes.

## NEW RESISTANCE TYPE THERMOMETER

As a substitute for the thermo-electric pyrometer in the measurement of low temperatures, the Brown Instrument Company, Philadelphia, Pa., has brought out an instrument of the resistance type. It is designed for measuring temperatures from 200 degrees below zero to 1,800 degrees F., and can be used for measuring temperatures found in dryers and ovens, in the bear-




A NEW RESISTANCE TYPE THERMOMETER DESIGNED FOR MEASURING TEMPERATURES FROM —200 TO 1,800 DEG. F.

ings of machines which may overheat, in the windings of motors, in transformers, on refrigerating machines, and in rooms where a constant temperature must be maintained. The special advantages claimed for the instrument are the ability to read moderate temperatures from one central location without it being

necessary to go from one point to another to read the temperatures as indicated on thermometers, and freedom from breakage, as the bulbs used are all of metal.

The instrument consists of a bulb or coil of resistance wire through which an electric current passes. This coil changes its resistance with changes in temperature, and there are a number of bulbs located at different points around the plant that are connected by a three-wire cable to the indicating instrument and the switchboard. This can be placed at any desired point, and to determine the temperature it is only necessary to switch any one of the bulbs across the terminals of the indicating instrument. If it is desired to maintain a constant temperature the pointer can be turned to coincide with the desired graduation on the lower scale, and any movement of the pointer on the upper scale will show the increase or decrease in the temperature. Either dry cells or storage batteries, or 110 or 220 volt direct-current lighting circuits, can be used to operate the thermometer.

## MILLING AND THREADING TOOL

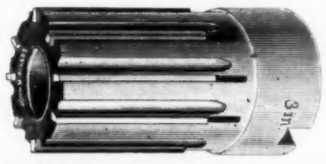
The John M. Rogers Works, Gloucester City, N. J., manufacture the adjustable thread cutting and milling tool shown in the cut. This tool is made in a range of six sizes, a complete set having a threading and milling capacity from 1/16 to 2½ inches, inclusive, and as it admits of very fine adjustments, a complete set of these tools represents a producing capacity of

NEW MILLING TOOLS.
THREADING CUTTER. PLAIN CUTTER.

an immense number of ordinary solid milling and threading tools.

This tool is claimed to be absolutely "fool-proof" and of such a durable make-up that a long term of efficient, unimpaired service is insured. The range of its actual capabilities is said to be so wide and varied that it is limited solely by the judgment of its owner in finding for it an endless number of odd (and regular) jobs.


ADJUSTABLE BLADE HAND REAMER.



ADJUSTABLE BLADE SHELL REAMER.

ADJUSTABLE BLADE CHUCKING REAMER.

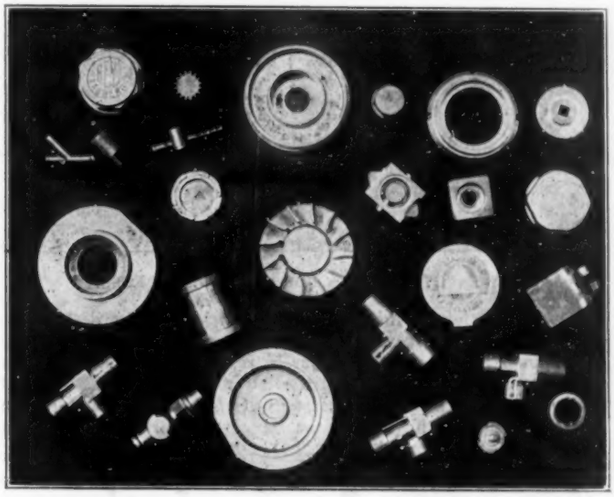
The Rogers company also manufacture an extensive line of reamers, some of which are shown in the accompanying cuts. For instance, Fig. 2 shows an adjustable blade hand reamer; Fig. 3, an adjustable shell reamer; Fig. 4, an adjustable blade chucking reamer, and Fig. 5, an adjustable blade taper shank

ADJUSTABLE BLADE TAPER SHANK CHUCKING REAMER.

chucking reamer. These tools are sold principally to the brass-working machine shops. Further information regarding these tools may be obtained by referring to catalog No. 8.

## HYDRAULIC PRESSED BRASS PARTS

A method has recently been perfected in Germany by which brass machine parts, plumbers brass fittings, etc., are produced from solid blocks of brass or bronze by hydraulic pressure. This method is said to be destined to revolutionize the brass foundry business, as it will do away with the cast-



BRASS PARTS HYDRAULICALLY PRESSED.

ing of small parts where the number required warrants the making of the necessary dies.

These pressed pieces are claimed to be infinitely stronger than any that can be made by casting. The surfaces are perfectly smooth, and the edges clean cut, and machining is required only to a limited extent.

Every piece is absolutely perfect and non-porous, so that losses in material and labor as with castings cannot result in machine shops who use these brass parts. It is stated that the pressed article can be produced at a lower price than is now paid for castings. The agent for the manufacturers of the pressed brass parts is R. F. Lang, 8-10 Bridge street, New York, and any information can be obtained from him.

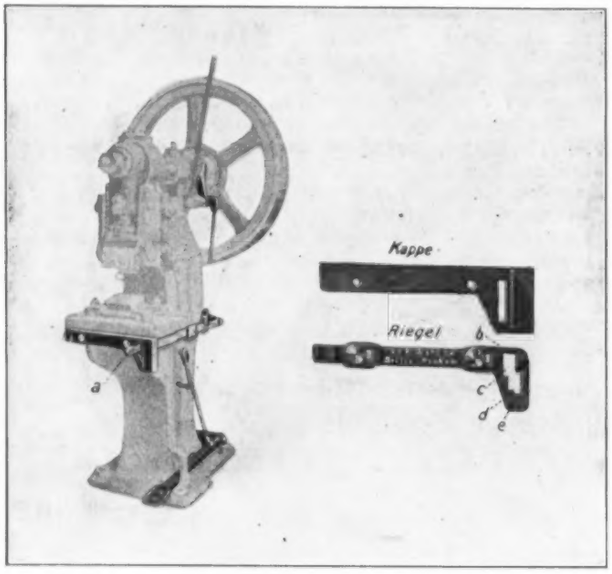
## SAFETY DEVICE FOR ECCENTRIC PRESSES

By Robert Grimshaw.

The laws of the land and of humanity demand that those who operate machinery shall be protected from danger of mutilation by unavoidable features of construction of the machine, or from their own carelessness; in other words, that as far as possible every machine shall be made "fool-proof." In the case of eccentric presses, the most usual types of device for this purpose hold the operator's hand away from the danger at the moment of danger, but many of these lessen the capacity of the workman, and some of them are in themselves dangerous in that they seize on parts of clothing, or even the fingers.

A new device intended to do away with these disadvan-

tages is that of K. Wahl, of Pankow, consisting essentially of a bolt which locks the control lever *a*, an angle iron serving as a rest for the left hand, and a cap guiding the lever *a* in its slot, and preventing the workpiece from falling between the guide surfaces. When the machine is at rest, the bolt is pushed to the right and touches a dog; and the hand lever *a* is in its highest position *b*. In order to throw in the machine, the bolt must be




A SAFETY DEVICE FOR ECCENTRIC PRESS.

moved to the left by the left hand, and held there until the lever *a* can leave the steps in the opening, and be pressed down to the point *e*. While the lever passes from *d* to *e*, and the hands are kept away from the arm, the latter has done its work and has returned to the position of rest. If the workman should take away his right hand during the dangerous period, the lever *a* would return to its upper position; or, if the left hand did not do its part, the lever would stick in one of the steps and the machine could not make its throw.

With the usual construction, the press must be thrown in anew for every stroke; but this is here only possible when the bolt has been thrown to the right, on account of the stop *f*. As the movement of the bolt to the right takes place during the dangerous period, this, as well as the movement of the hand lever, is effected by a spiral spring. For this reason, both hands are free as soon as the arm has reached its position of rest. The device is not complicated enough to make learning its use a matter of more time than that required to make a few strokes.

## NEW BURNISHING BARREL

The tumbling and burnishing barrel shown in the cut is intended for use in finishing operations where steel balls are employed for burnishing and polishing, and also for sand tumbling. These barrels are made with one, two and three compartments which are water tight.

This barrel has recently been put on the market by the Charles


NEW TUMBLING AND BURNISHING BARREL.

F. L'Hommedieu & Sons Company, Chicago, Ill., and is known as the Reliance. The barrel has double doors so that the compartments may be washed out thoroughly. The stand is ample high to permit of a receptacle being placed under the barrel, which facilitates dumping out the work. Further information may be obtained by corresponding with Charles F. L'Hommedieu & Sons Company, 30 South Clinton street, Chicago, Ill.

# Associations and Societies

**REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.**

## AMERICAN FOUNDRYMEN'S ASSOCIATION

**President, H. D. Miles, Buffalo, N. Y.; Secretary and Treasurer, A. C. Backert, Cleveland, Ohio. All correspondence should be addressed to the secretary, A. C. Backert, Cleveland, Ohio. The objects of the Association are for the educational welfare of the iron and metal industry. Annual convention the latter part of the summer or early in the fall each year, in a succession of cities, as invited. The Convention of 1914 will be held in Chicago, September 7-12.**

Secretary Backert reports that the following papers have been promised for the convention to be held in Chicago, September 7 to 12:

PAPERS ON SAFETY WORK.

"Safety in Foundry Operations," address by M. W. Alexander, General Electric Company, West Lynn, Mass. "Safety First," by W. F. Risdenbach, Genesee Metal Company, Rochester, N. Y. "Progress in the Safety First Movement," by Arthur T. Morey, Commonwealth Steel Company, St. Louis. "Safety in Connection with Grinding Wheel Operations," by R. G. Williams, Norton Company, Worcester, Mass. "Safety and Sanitation," by A. W. Gregg, Bucyrus Company, Milwaukee. "Safety First—Driving Back the Saloon," by Thomas D. West, Cleveland. "Sanitation and Safety First as Applied to the Brass Industry," by F. Moerl, Chicago.

FOUNDRY EQUIPMENT AND APPLIANCES.

"Electric Motors and Controllers for Foundry Operations," by S. H. Libby, New York. "The Second Story Foundry," by G. K. Hooper, Hooper-Falkenau Engineering Company, Detroit. "Economics of Motor Drive," by H. F. Stratton, Electric Controller & Manufacturing Company, Cleveland. "Abrasives in the Foundry," by Mr. Dietz, Norton Company, Worcester, Mass. "Refractory Material," by Mr. Kelly, Harbison-Walker Refractories Company, Pittsburgh. "Molding Sand Tests," by Dr. Richard Moldenke, Watchung, N. J.

COST CONGRESS.

"Foundry Cost Keeping," address by F. J. Stevenson, Cost Expert National Association of Stove Manufacturers, Hoosick Falls, N. Y. "Efficiency in Foundry Operations, the Essential Factor in Reducing Production Costs," address by A. K. Hathaway, Tabor Manufacturing Company, Philadelphia. "Efficiency in in Foundry Work," by F. A. Parkhurst, Aluminum Castings Company, Detroit. "Revision of the A. F. A. Standard Foundry Cost System," by Harrington Emerson, 30 Church street, New York City. "Prevailing Practice in Estimating the Selling Price of Castings," by A. C. Backert.

## AMERICAN ELECTRO-PLATERS' SOCIETY

**(AN EDUCATIONAL SOCIETY.)**

**President, J. H. Hansjosten, Kokomo, Ind.; Secretary, Walter Fraine, 507 Grand Ave., Dayton, Ohio. All Correspondence should be addressed to the Secretary. The objects of this society are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. The society meets in convention in the spring of each year, subject to the decision of the executive committee. The next convention will be held at Dayton, Ohio. The branch associations hold monthly and semi-monthly meetings in their various cities.**

**New York Branch** held their regular monthly meeting Friday, July 24, at the Broadway Central Hotel. The aims and objects of the society and the best way to diffuse knowledge among its members were discussed. An outing of the New York and Newark Branches will be held at Glenwood, L. I., N. Y., August 16. Full particulars may be had by corresponding with either of the secretaries of the above branches.

## FOUNDRY AND MACHINE EXHIBITION COMPANY

Secretary Hoyt reports that the total number of exhibitors for the Chicago exhibition September 7-12, 1914, now numbers 140. He states that all lines are well represented, but it is impossible at this time to furnish a complete list. The list that has been published is said to be very incomplete. Arrangements for entertainment are coming along in fine style.

A circular has been sent out calling attention to the fact that in view of the war in Europe now is the time for American manufacturers of foundry appliances and supplies to exhibit and then secure their part in the business that is sure to follow in the next few years.


**ITEMS OF INTEREST TO THE INDIVIDUAL.**

M. C. Sullivan has accepted a position as plater and polisher with the Pioneer Electro Plating Company, of Miami, Florida.

Fred C. Ohlmacher, representing The Ele-Kem Company of Chicago, Ill., is making a 30-day tour in the east in the interest of his company. Letters for Mr. Ohlmacher may be sent to the office of THE METAL INDUSTRY.

C. E. Eggleston, formerly with the Charles Parker Company, Meriden, Conn., is now connected with the Pittsburgh Lamp, Brass and Glass Company, Pittsburgh, Pa., as foreman of their plating and polishing departments.

Albert A. Pott, sales manager of the Baird Machine Company, manufacturers of tumbling barrels, presses, etc., Bridgeport, Conn., left New York on July 15 on the Steamship "France" for a two months' trip through the British Islands and France, visiting their foreign representatives and getting in touch with foreign trade in general. The company reports that they have noticed quite a little pick-up in foreign trade in the last few months and Mr. Pott makes his trip at this time in order to become thoroughly acquainted with any new phaze of foreign tendencies as well as to take care of their increasing foreign trade.

## DEATHS

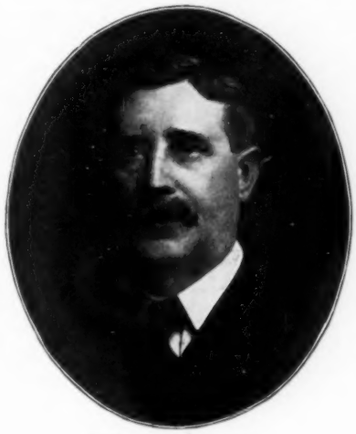
Erskine Andrus, of Bridgeport, Conn., died August 6, 1914, at the age of 84 years. Mr. Andrus was probably the oldest brass caster in the United States.

Alexander Watson Cadman, president of the A. W. Cadman Manufacturing Company, manufacturers of brass, babbitts and other bearing metals, Pittsburgh, Pa., died at his home in Edgewood, Pa., July 19.

George F. Heer, for many years foreman of the Hero Manufacturing Company, Philadelphia, Pa., brass, bronze and general metal workers, at Gaul and Adams streets, died on Tuesday, July 29, following an illness of several months. Mr. Heer was forty-four years old, and was for many years identified with the metal trades throughout this city and vicinity.

Charles Sparks, general manager of the Michigan Copper & Brass Rolling Mills, Detroit, Mich., died suddenly at St. Louis, July 16, following a nervous breakdown. He had been connected with the Michigan Copper & Brass Rolling Mills since its organization eight years ago and previously had been identified with the Simmons Hardware Company, of St. Louis, Mo.

## JEREMIAH HOWE



JEREMIAH HOWE.

After a year's illness, Jeremiah Howe, former superintendent of the Michigan Copper & Brass Company and prominent clubman, died at his home, 227 West Grand Boulevard, Detroit, Mich., on July 9. Mr. Howe was born in Tipperary county, Ireland, in 1850 and came to America in 1871. In 1878 he was married in Torrington, Conn., where for ten years he was connected with the Coe Brass Company. After Mr. Howe severed his connection with the Coe Brass Company in 1881, he went to Detroit, Mich., where he became superintendent of the Detroit Copper & Brass Rolling Mills in 1883. In 1905 he resigned this position to assist in the formation, equipment and operation of the Michigan Copper & Brass Company, of which he was a stockholder. Leaving Detroit in 1909 Mr. Howe went to Buffalo, where he assisted in the organization and operation of the Buffalo Brass and Copper Company, becoming superintendent of this concern. Failing health caused him to retire from active business life in 1912, when he made a trip to the land of his birth, and since his return to this country he had been living quietly in hopes of recovering his health.

Mr. Howe was a member of the Knights of Columbus, the Detroit Board of Commerce, the Detroit Engineering Society and the Rushmere Club. Surviving him are a widow and seven children.

# Trade News


BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

## WATERBURY, CONN.

AUGUST 3, 1914.

Some dullness is unusually marked hereabouts this season in most of the metal industries. One or two of the smaller industries have been busy, seemingly a little busier than usual, for several months, but there is a marked slump now and the outlook for an early revival of the old time "snap" is not very clear. In fact it is no more certain than that there will be a remarkable shortage of stocks of all kinds throughout the nation soon and plenty of money in the hands of consumers to buy new goods.

One of the largest plants in Waterbury is the Waterbury Clock Company. It gave its employes a week off on the approach of July 4, for vacation. On their return they learned that there would be another week's shutdown from July 24 to August 3. This, in view of the five-day schedule so long in effect there, was not welcome news. Forces were reduced also. On returning to work, August 3, the hands learned that the schedule was to be reduced to four days, indefinitely. Europe's war is an added burden to industries like the clock and watch industry, for with foreign fields shut down against them, American manufacturers of such goods will have difficulty maintaining their great establishments at the standard of recent years. Then, too, there are the adverse conditions which existed before the war.

Chase Rolling Mills Company is operating as busily as any concern in this valley, and apparently under prosperous conditions, but its business is not what Naugatuck valley folks would call good and prospects are poor. There is no demand for help.

The Waterbury Manufacturing Company, whose varied line of industrial products makes it possible to keep busy in most departments, even when ordinary conditions are adverse, is not gaining headway, and its plant may be added to the list of notably dull places in the near future, although a brisk revival of demand for any of a number of novelties may start the pendulum swinging in the other direction.

The Scovill Manufacturing Company is not busy, only such gangs being employed nights as are necessary on account of the plan of shop management.

All the smaller concerns report that business is going but prospects are not encouraging. As one manufacturer put it: "There are lots of inquiries, lots of them. You see they have time to inquire and to keep on inquiring and there apparently is not much necessity for them to order. Consequently inquiries are plentiful; orders few."

Two new small industries are starting here this month. A few days ago The National Company opened its new plant on Brown's road, near the plant of the Waterbury Rolling Mills Company and began drawing brass tubes. The addition of this model new plant to the community of small concerns on Watertown road, stretching along through Brown's farm, indicates the trend of manufacturing development and forecasts a rapid growing together of Waterbury and Watertown communities in the next decade.

As with orders, so with cash. Cash business is as good as it ever was, but collections are aggravatingly slow. War prospects here are not favorable for immediate stimulation to industries, through a prolonged European conflict undoubtedly would cause a great boom in the brass business. At present many pieces of machinery made for German and English and Austrian customers are held up, orders for shipment having been cancelled by cable. Foreign orders are indefinitely suspended and goods packed for shipping are held at several of the factories.

August may bring changes that will turn the tide of business towards flood again, and it is the earnest wish of both employers and employes that it will, but there are none who will venture a prophecy under the circumstances.—F. B. F.

## NEW BRITAIN, CONN.

AUGUST 3, 1914.

Inquiry into the condition of business in local metal manufacturing concerns has just been made by THE METAL INDUSTRY correspondent, and it is found that in general business is fair, and there are some instances in which most satisfactory conditions exist. Whether or not the metal manufacturing business is improving at this time would be hard to say, but it is not falling off any. Manufacturers have either completed or have contracted for approximately $400,000 of factory buildings, and the heads of some concerns are looking to better days in the near future.

Although the working force at Landers, Frary & Clark's is smaller than it was a year ago, the running time is again fifty-five hours per week. This year will see about $125,000 worth of new buildings added to this concern, and in a month or so a new eight-story building will be ready for occupancy. A three-story celluloid shop, in addition to a new tinning shop and a forge shop, are also under way.

At the Stanley Works business is much better than at some of the factories, and Vice-President E. Allen Moore states that the concern is running fifty hours per week. How much smaller the work force is now than a year ago Mr. Moore cannot state, but he says that the sales are not what they should be. Another big stride of progress due to the general expansion is about to be taken by this factory through the erection of a seven-story concrete building at a cost of $100,000. Work has been started and it will be ready for occupancy by January 1. In reference to this, Vice-President Moore said: "The building is in a line with general expansion. Of course, you know we are expanding in the West and must do the same here. We need elbow room in our New Britain plant."

B. A. Hawley, general manager of the Russell & Erwin Manufacturing Company, states that while there are not many orders on hand, business is fair.

"We've had lean business for the past two or three years," said Carlisle H. Baldwin, general manager of the Corbin Cabinet Lock division when asked how business was with him. His plant is working fifty-five hours a week.

Officials at the Corbin Screw division state that orders do not come fast enough to rush them, so they are operating on a fifty-hour schedule, with fully 20 per cent. less help than in 1913.

In the opinion of President A. W. Stanley, of the Stanley Rule & Level Company, the labor conditions which exist in New Britain do not reflect the industrial conditions which prevail generally throughout the country, as he thinks this city is better off than many others. No new buildings will be erected this year, the company has reached the limit of stock it wishes to carry, and is now working on a fifty-five-hour schedule, he states. The working force here is also less than a year ago.

The working force of North & Judd has been reduced, and in the opinion of President H. C. Noble will be reduced more. He says that a reduction in the cost of labor will necessarily follow the coming of foreign goods.

President George W. Traut, of Traut & Hine, states that business is "fair" and he anticipates an increase in business in consequence of the big crops. E. J. Skinner, of the Skinner Chuck Company, says business is pretty fair and his shop is working fifty-nine hours per week, in addition to building a new addition. Plenty of orders are on hand and a successful fall season is anticipated.

Business is slack at the New Britain Machine Company, and President Platt says he cannot prophesy as to the future. President Corbin, of the Union Manufacturing Company, also states that business is very poor. No new orders are coming in and the working force is 15 per cent. smaller than usual. President Porter states that business is normal at the National Spring Bed Company, and there is nothing to get excited over, and at the

Hart & Hutchinson plant there are orders ahead for the next two months, so "they should worry." This also applies to the Waterbury Tool Company.

At Hart & Cooley it is said that business could be much better. Last year the concern was running twenty-four hours a day, and at present fifty-five hours per week is the limit.

Rushing business, however, is reported at the Beaton & Cadwell Company, where its employees number twice what they did a year ago and business for the last quarter has been better than ever before. The P. J. Flannery Company also reports progress and the officials say that business is booming, so much so in fact that it will be necessary for them to build a new $10,000 addition.

The above concerns are all metal using factories, the products manufactured being either builders' hardware, cutlery, buckles, castings, spring beds, steel lockers, etc.—H. R. J.

## PROVIDENCE, R. I.

AUGUST 3, 1914.

It is a long time since the metal trades of this city and vicinity have been so generally dull as at present and many view with considerable apprehension the war cloud now hovering over Europe. The unsettled business conditions throughout this country for several months past have materially curtailed activities hereabouts and it is feared that the influences of the European conditions will have a further deliterious effect here. The manufacturing jewelry industry is at a very low ebb, in fact, the lowest in nearly half a century, with no prospects of any improvement in sight. The sheet metal concerns supplying building work are fairly busy, although there has been a recent falling off in prospective work. Taken as a whole, the local prospects are far fairly busy, although there has been a recent falling off in prospective work. Taken as a whole, the local prospects are far from assuring. The business at the plant of the R. Plews Manufacturing Company, of Central Falls, manufacturers of tin cylinders and metal work, is said to be as good as can be expected, with enough orders to keep the employees busy on a full-time schedule.

An invention that will revolutionize the making of metallic tubes has been perfected in the plant of the Metallic Shell and Tube Company at East Providence and the company has started making tubes by the new process. The inventor is named Hooker and it is said that he has been working on the machine for the past seven years. Instead of making the tubes in the old way and soldering them down the length, the new method stamps a tube out of a small blank about an inch in size, with one stroke of the press hammer. Tubes made of brass for automobile radiator honeycombs are stamped out 13 inches in length and all finished. Tubes 30 inches in length have been stamped out of lead blanks, these latter tubes being used for the manufacture of railroad torpedoes, the business in which the company has heretofore been engaged. The method of making tubes is said to be one of making the metal flow under the tremendous pressure of the hammer when it hits the blank. The tube is forced out of the end of the die, almost perfectly uniform in thickness, the size being 1/6000 of an inch. The cost is less than one-fourth that of making tubes under the old method. It is said that the right to manufacture under the new process has been sold a New York firm, and that the local plant and the New York concern will retain the rights to the process to themselves for the future.

H. J. Astle & Co. recently shipped several Boland sand blasts and blowers to the Chadwick Bran Company, at Hamilton, Ont., and is now completing a large four-cylinder Boland patented pressure blower, weighing about two and a half tons for the American Optical Company, at Southbridge, Mass.

The United States Circuit Court of Appeals has handed down a mandate reversing the decision of Judge Arthur L. Brown in the case of the W. H. Coe Manufacturing Company against the American Roll Gold Leaf Company. In the original decision, Judge Brown held that the patents held by William H. Coe were good and valid patents, and that the defendant company had infringed upon them. The patents were issued for packaging of decorative gold leaf. An injunction was issued against the American Roll Gold Leaf Company and an accounting was ordered. This is reversed by the decision of the Court of Appeals, which finds for the defendant.—W. H. M.

## BOSTON, MASS.

AUGUST 3, 1914.

Opinions vary widely regarding the actual conditions prevailing in the metal industries of this city and vicinity. Some of the manufacturers consider the outlook better in the matter of general trend of business sentiment, feeling pretty sure that there are no surplus stocks of various kinds on hand, so that current demand is likely to create a fair volume of business in all lines.

There is a great diversity of feeling as to the prospects that may develop on account of war movements abroad. Curtailment of export demands in many lines of products is predicted, and doubt is expressed as to whether this country will be able to absorb the output. On the other hand, the possibility that many foreign workmen will return to Europe to take part in the impending conflict makes it seem likely that there may be a scarcity of workmen in some trades.

Employers do not relish the idea that labor may be scarcer than it has been in the past year or two, for there has been a boosting of wages that has borne heavily upon the manufacturers in a number of lines. In the silver and gold industries and among the platers there is a fair business this summer. One Boston concern in particular has enlarged within a month, the Tuttle Silver Company branching out into the manufacture of colonial ware and seeking new markets for its products.

Union labor is very strong here and aggressive. This is instanced in the case of the sheet metal workers, who some time ago opposed the working by members of the organization on the new State House extension, because the firm of E. B. Badger & Sons, with which the union was at loggerheads, was awarded the contract.

Charles S. Taylor, mayor of Medford, who is at the head of the Boston Nickel Plating Company, is a candidate for a third term in that office.

About a year ago there was a raid by thieves upon the downtown office buildings, nickel and silver-plated fixtures being wrenched off and stolen in large quantities. About a week ago similar depredations were begun again, and the police are on the watch for robberies of this character. The latest thefts of the kind were in the big Tremont Building.—J. S. B.

## BUFFALO, N. Y.

AUGUST 3, 1914.

Business has not improved any, since last month, with the local metal concerns, in fact there has been a very decided drop in the operations of the foundries, finishers, and electroplaters. Local men no longer think the cause of this slump in business as psychological, but rather one based on cold facts. And as one man puts it, "President Wilson is trying to make good his promises which has resulted in a slump and if it keeps up we will have soup houses by winter." The local concerns are in a turmoil. They do not know if they should continue to be in a state of preparation in the event of a sudden return of good business and lose money by so doing, or to take a chance on losing some of the business in the event of a sudden rush. In fact some of the concerns at the present time are not meeting their overhead charges.

To give the reader an idea of the actual conditions a few instances will be cited. One foundry which had sixty men constantly employed in its shop now has only three men working, another only two. Two firms, among the largest in the city, are working only half its forces three days a week, while one of the big electroplaters is only working its forces from 9 a. m. to 3:30 p. m., five days a week. It has also been rumored about the city that the American Radiator Company are contemplating the shutting down of their bond plant which employes some 1,500 to 2,000 men for an indefinite period.

One of the biggest cases that were ever held before the tribunals in this part of the state was begun on July 11, when Judge John R. Hazel in the United States District Court named James O. Moore, Buffalo, James A. Roberts, New York, and A. Henry Ackermann, Niagara Falls, as receivers under bond of $100,000 for the United States Light and Heating Company, a $17,500,000 Maine corporation with their main offices and plant at Niagara Falls and others in Buffalo, Detroit, Chicago, Boston, Washington and London, who have about $3,000,000 in assets and liabilities

listed at about $900,000, directing them to continue the business of the company.

S. A. Day Manufacturing Company, 23-25 Demond Place, Buffalo, since moving into their newer, larger and better equipped plant are spreading out their territory as they are now able to handle a larger business.

Pratt and Letchworth, 170 Tonawanda street, Buffalo, are erecting a new $20,000 steel brick annealing structure to their present plant.

DeMar Manufacturing Company and the International Register Company are building large plants in Fort Erie, Ont.

The American Bronze Company, Arthur street, Buffalo, have added a new department to their establishment where they will handle any kind of armature bearings, gibbs, rod brasses, all the various grades of babbitt and solder, bronze sleeves, mill bearings and other castings for street railways and railroads.—G. W. G.

## NEWARK, N. J.

AUGUST 3, 1914.

A. Griffoul & Brother, of Chestnut street, has gone out of the gold and silver founding business as applied to jewelry, and are now doing gold, silver and bronze founding in the line of statues, busts, specialties for the trade, etc.

The Elite Novelty Company, manufacturers of brass and German silver novelties and plated goods, have taken an extra floor in the Shiman-Miller building and have increased their output considerably. Their New York office has been moved from 416 Broadway to 11 Maiden Lane.

George S. Tuncliffe and Joseph McBride recently started in the plating business at East State street and Olden avenue, Trenton, N. J.

The Newark Art Foundry, manufacturers of gold, silver and bronze castings, have gone out of business.

Joseph Landsman, of New York City and the Wordside Sterling Company have combined as the Globe Art Company, with factory at 69 Winthrop street, and will manufacture silver goods and silver deposit ware.

The New York Stamping Company, manufacturers of percolators, etc., at 291 Broadway, New York City, have opened a branch showroom at 387 Washington street, Boston, Mass., in charge of E. C. Stetson.

George W. Heath & Co., manufacturers of gold pens, report that they are perfecting a sterling silver which will not tarnish.

J. L. Sommer, making brass buckle shoe novelties, has enlarged his factory by taking another floor in the new building at 97 Chestnut street.—H. S.

## COLUMBUS, OHIO

AUGUST 3, 1914.

A slight improvement in the metal market in Columbus and central Ohio is reported during the past month. All metals have shared in the better feeling. The improvement is not so far-reaching as to affect prices, but the volume of business is larger than last month at this time. The tone of the market is also better. Dealers and users of metals are of the opinion that the improvement will continue from this time on.

The copper market has been quiet and prices are well maintained at the levels which have prevailed for some time. More steadiness has developed in brass. Yellow brass scraps are quoted at 8¾ cents to the trade and red brass at 11½ cents. Babbitt metal is moving a little better and prices are fairly steady. Aluminum is quiet and prices to the trade are between 18 and 19 cents. Other metals are unchanged.—J. W. L.

## CINCINNATI, OHIO

AUGUST 3, 1914.

There is noticeable in Cincinnati a perceptible improvement in the tone of business in practically all lines, in which, as a matter of course, the metal industry has participated. The pre-eminence of the city in machinery and manufacturing lines makes metal working very important, and they are naturally the first to feel any improvement in business. That they have been able to note such an improvement lately, in the shape of more and better orders for equipment of various kinds, and for repairs to machinery, is highly significant, and can mean only that the business world is on the brink of an approximately complete recovery from the depression which has existed for several months past. The coppersmiths are perhaps less affected by this improvement than any other branch of the industry, as their chief customers, the liquor trade, are buying very conservatively, in view of the continued prohibition agitation. Aside from this, however, conditions may safely be said to be decidedly better, with every indication of continued improvement until at least a normal tone is reached.

One of the appreciably favorable factors in the recent improvement in business in Cincinnati is the fact that the carpenters' strike, which had been in progress since May 1, has been settled, the men returning to work a week or so ago. The plumbing trade had been directly affected by the strike, which tended to cut down greatly the amount of new work, and the resumption of building, which bids fair to be of a very large volume during August and September, will cause considerable activity in several branches of the metal trades.

The Covington Industrial Club, of Covington, Ky., just across the river from Cincinnati, was recently successful in landing a new industry for the city, the Warman-Wolf Aluminum Foundry Company, of Madisonville, O., deciding to move its plant to a site on West Fifth street, in Covington. The various details of the move are being worked out, and it is expected that the plant will be in operation in Covington in a short time.

The new plant of the Springfield Brass Company, of Springfield, O., which is of concrete, and has been in course of construction for some weeks, is expected to be finished soon. It will be modern in every respect, and the company expect to be able to transact its business much more advantageously when it gets into the new building.—K. C. C.

## DETROIT, MICH.

AUGUST 3, 1914.

The brass and aluminum industry in Detroit and Michigan is not in as bad condition as it might be, is the opinion of S. O. Roberts, of the Roberts Brass Manufacturing Company, here, expressed in an interview in reference to business conditions as he sees them at this time. This opinion bears weight because Mr. Roberts's company produces a variety of brass products which includes about everything manufactured in this line.

"While my plant is operating about 80 per cent. below normal, I have the utmost confidence in future prospects," Mr. Roberts declared, in an emphatic manner, when asked for his views just as he saw them and without coloring.

"While business is not as good as it should be, we have nothing to fear and as soon as the dull summer period is over we are going to see a most decided improvement—not only in the brass and aluminum business, but in every branch of business. Things are bound to change, and even at this time I can see a movement towards normal conditions all along the line.

"The plumbing business will soon begin to pick up, as this product is required for the great amount of new buildings that have been erected, not only in Detroit, but throughout the state, and the entire country as well. A great amount of new building has been in progress during the last six weeks and this all requires plumbing supplies. During the first sign of depression, banks and men who had money to invest looked to real estate investments and an unusually large amount of building was started. That move alone is already beginning to be felt in the plumbing industry, and conditions are going to be better for a time at least. Late in the fall there will, of course, be another dull period for a time, but that will improve again just as soon as spring operations begin.

"If we could prevail on Congress to cease business for a while, there would be a most decided change for the better at once. Business is only waiting now for the opportunity to proceed and as soon as it is given half a chance it will revive."

The opinions expressed above seem to be general among manufacturers in all lines of the metal trade. But during the last two or three months it has been dull. Good crops and the adjournment of Congress will make a decided change in conditions in Michigan and the Middle West, within the next few weeks.

The Detroit Insulated Wire Company has undergone somewhat of a reorganization during the last month. Joseph H. Hunter has been elected president, and J. G. Spilane, vice-president.

James Inglis is now chairman of the board of directors. Mr. Spilane was formerly connected with the Standard Oil Company and also at one time was president of the Pittsburgh & Allegheny Telephone Co., at Pittsburgh, Pa. The new secretary and treasurer of the company is C. C. Gray, who has been sales-manager since 1912. Mr. W. G. Dalgleish, the assistant secretary and treasurer, has worked his way up from a minor position, and is regarded as a most capable man in this line of business.

Philip Eipper, of the wholesalers' and manufacturers' bureau of the Detroit Board of Commerce, has recently returned from a trade extension survey in the northwestern part of the lower peninsula of Michigan. He reports business prospects good and that buyers in that section of Michigan are planning to do business with Detroit manufacturers as soon as the railroads can give them the proper service. The G. R. & I. and the Pere Marquette will be asked to increase the service to that section of the state, so this prospective business may be handled satisfactorily.—F. J. H.

## LOUISVILLE, KY.

AUGUST 3, 1914.

Business with the Louisville metal workers has improved to some extent during the past month, and the majority of the trade is feeling a good deal more optimistic over general conditions. The outlook is far brighter than it has been for several months in the liquor field, and a good deal of work is expected from this source later on in the fall. The higher grade metals are easily holding their own in the manufacturing field, and it is said that they are being used more extensively locally than for some time past. Prices on sheet copper have been advancing slightly of late, but the local trade expects them to hold about steady, as the demand is only about normal. Copper and brass tubing is firm, while steel and iron are advancing.

Louisville coppersmiths are not looking forward to any distillery building for some time to come, but expect to do a good deal more repair work this fall than was handled last season, when the distillers only made such repairs as were absolutely necessary in order to run. The fact that Texas has refused to join the ranks of the "drys" has encouraged the local distillers greatly.

"This is the busiest July that I have ever experienced," said J. W. Rademaker, manager of the Independent Brass Foundry. Government work has been coming into the local shop unusually well and the outlook is for a good run of fall business. A large number of "Government Bronze" packing rings have been molded recently for use on the engines and pumps of the big battleships. The Cheatham Switch Company, of Louisville, has been having a large number of bronze and other castings manufactured for use in their automatic electric switches.

J. L. Saylor, local manager of the Toledo Computing Scale Company, is also connected with the Distillo Manufacturing Company, a concern which is getting out a new, patented automatic coffee distiller or percolator. He is having a large number of aluminum castings made by the Independent Brass Foundry for use in these machines. Mr. Rademaker recently returned from a two weeks' trip to Atlantic City.

A new building being erected by the German Bank, one of the oldest banks in Louisville, will take a quantity of fine bronze work, as well as railings and window gratings. This bank is built on the classic Italian Renaissance style, and large quantities of bronze relief work will be used. The building is of Bowling Green stone. The Independent Brass Foundry got the contract for the greater portion of the brass and bronze work.

E. E. Sherman, of the Vendome Copper and Brass Works, is still in Louisiana, where he is personally directing the work on the Algiers Distilling Company's new plant, which will be one of the few Bourbon plants south of Kentucky.

Tom Hines, of Hines & Ritchey, reports that he has been very busy making copper coils for milk machinery lately. The last coils for tomato-canning plants were shipped the latter part of July to Utah, and this about closes up the canning work. A good deal of distillery work has been secured in the South and West, but very little in Kentucky. Mr. Hines figures that the market on sheet copper will hold its own or go lower. According to Mr. Hines there is an overproduction of copper in this country just now, and the European manufacturers are finding business rather dull and are not using it to any large extent. In case the war scare in Europe develops to any extent the manufacture of articles requiring brass and copper will be curtailed largely in Mr. Hines' opinion.—G. D. C., JR.

## NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Cox Brass Company, Albany, N. Y., has completed the erection of a new foundry building on Pleasant street.

The Titanium Alloy Mfg. Company, Sugar street and Lafayette avenue, Niagara Falls, N. Y., has completed plans for an addition to be made to its foundry.

A new building is being completed in North eighth street, New Philadelphia, Ohio, for J. C. Rath, manufacturer of aluminum and brass castings. He will employ 40 men.

The new factory of the A. H. Wells Company, Waterbury, Conn., will be used for manufacturing purposes, extending the firm's facilities for producing copper and brass tubing.

The Goshen Stamping & Brass Company, Goshen, Ind., has been organized with a capital stock of $15,000, to manufacture electrical heating devices. The incorporators are Arthur F. Ernest, Herman Schmidt and Cornelius B. Miller.

The Buffalo Copper & Brass Rolling Mill Company, Buffalo, will erect a chemical laboratory 24 x 140 feet, at its plant, Military road, Denver street and the New York Central Railroad.

The building which the Plume & Atwood Mfg. Company, Waterbury, Conn., has in process of construction will be used for manufacturing purposes, the company states. The structure will be 47 x 170 feet and five stories.

The E. R. Caldwell & Sons Brass Company, Syracuse, N. Y., has let the contract for the erection of a foundry and machine shop of brick and steel construction on West Fayette street, that city.

It is reported that Wm. Lipphardt & Sons, Louis & Chas., of Martins Ferry, are planning to erect a large enamel plant either in Bellaire or Martins Ferry, Ohio. Plant will employ 300 to 500 women.

The Clinton Wire Cloth Company, Clinton, Mass., proposes to build another addition to its works to be devoted to the galvanizing department. The building will be 86 x 91 feet and one story high.

The Enterprise Brass Works, Muskegon, Mich., will build a two-story, 44 x 96-foot addition to its plant. The company operates a brass and aluminum foundry, brass machine shop and plating and polishing department.

The Union Hardware Company, Torrington, Conn., will build an additional factory 22 x 71 feet, one story. They are now working on a small addition to their hardening room which will be ready for operation in about two weeks.

John Lebherz, president of the Frontier Brass Foundry, manufacturers of red and yellow brass, phosphor, manganese, etc., Niagara Falls, N. Y., has purchased the interests of his partner, Mr. John Phipps, and will continue the business under the above name.

The S. J. Asbell Company, manufacturers of brass goods of all kinds, Paterson, N. J., have purchased the large building on Putnam street, formerly used by the Ashley and Bailey Company as a storehouse, to meet the requirements of their largely increased business.

The Taplin Manufacturing Company, New Britain, Conn., has been organized to manufacture brass goods. E. E. Goodwin, New Britain, Conn., is president. George J. Angerbower, Forestville,

Conn., vice-president, and Arthur Goodrich, Middletown, Conn., secretary and treasurer.

The report that the Aluminum Company of America had purchased 118 lots at Edgewater, N. J., for a manufacturing plant, is stated by R. A. Hunt, general superintendent, to be incorrect. The property in question is admitted to be under option, but no building is contemplated in the near future.

Morrison Brothers, Inc., Dubuque, Iowa, are offering to the plating trade their line of steel tanks. These tanks are welded throughout, making the inside perfectly smooth. They are intended especially for lye and cyanide and if properly coated give excellent satisfaction as plating tanks.

The Chicago Aluminum Castings Company, 2647 Ogden avenue, Chicago, Ill., have broken ground for a one-story brick and concrete foundry 50 x 150 feet, to cost $10,000 and which they expect to have in operation about September 15, 1914. They will operate an aluminum foundry exclusively.

The Mueller Brass Company, manufacturers of brass goods, Sarnia, Ont., Canada, advise that the published report that they will erect a foundry to cost $25,000 is not definite, as there has been no positive conclusion in the matter, although they will no doubt erect a foundry within the next two years.

The Bristol Company, manufacturers of recording instruments, Waterbury, Conn., have established a district branch office in Boston for the purpose of serving their customers in that vicinity. F. H. Emerson, one of their sales engineers, has been appointed manager and will have his headquarters in the Old South Building, Boston, Mass.

The Henrich Company, of 93 South Main street, Memphis, Tenn., claim that they have solved the plating problem through their platinum plating solution, which they have put on the market through the following jobbers: E. W. Reynolds Company, Los Angeles, Cal., Thoma Brothers Company, Cincinnati, Ohio, and H. H. Hawley Company, Dallas, Tex.

W. B. Booz, president of the Gibson & Kirk Company, 211 Key Highway, Baltimore, Md., reports that they are building a two-story brass foundry, 30 x 65 feet, for the manufacture of hardware. This company, besides operating a brass foundry, have a brass machine shop, plating and polishing department and lacquering or japanning department.

The Brown Instrument Company will occupy its new factory at Wayne and Windrim avenues, within a half block of Wayne Junction station, Philadelphia, Pa., about October 1. The building is two stories in height of the most modern construction, for facilitating the manufacturing and calibration of scientific instruments. A power plant will also be installed.

L. Vogelstein & Company, 42 Broadway, New York, furnish the following figures of German consumption of foreign copper for the months January to May, 1914: Imports, 99,788 tons; exports, 2,969 tons; consumption, 96,819. This compares with consumption in the same period of 1913 of 90,567 tons. Of the quantity imported 87,684 tons came from the United States.

The Hickok Manufacturing Company, Harrisburg, Pa., manufacturers of bookbinders' machinery, etc., contemplates, some time in the near future, building a new plant and their engineers are now preparing the preliminary work for it. The specifications will call for new foundry equipment for both brass and iron foundries, some wood working machinery and small traveling cranes.

Plans are being made by the Columbus Brass Company, Columbus, Ohio, for centralizing its business with enlarged facilities at its Dublin avenue plant. This will mean giving up its plant in North Fourth street, which has been used for general offices and jobbing business. The plant in Dublin avenue will be extended and equipped with facilities for handling a much larger business. The Fourth street plant is to be rented.

The Simmons Manufacturing Company, Kenosha, Wis., has broken ground for two additions to their plant. One, 200 x 60 feet, will be for brass and gray iron foundries and blacksmith shop and the other, 260 x 60 feet, for machine shop, drafting room and pattern shop. Both buildings will be of fire-proof construction and when completed will serve to house model departments. This company is the largest manufacturer of metal beds, springs, etc., in the world.

The Eureka Pneumatic Spray Company, 62 and 64 Ninth avenue, corner Fifteenth street, New York, manufacturers of the well-known Eureka and other lacquer and enamel sprayers and accessories, announce that they have begun suit in the Second United States District Court, Southern New York, against the International Spray Company, and John Giorgio, New York, for infringement of certain patents. They demand an accounting of sales and damages.

The Philadelphia Casket Hardware Company, Ltd., 2137-43 East Firth street, Philadelphia, Pa., has been formed by George Fox and Paul J. Startzman to manufacture a line of high grade casket hardware and all kinds of soft metal specialties and also to do job plating on a large scale. Mr. Fox is one of the firm of Kappler-Fox Foundry Company, manufacturers of stove ranges, etc., and Mr. Startzman was formerly connected with the Sterling Casket Hardware Company, of Brooklyn, N. Y., as superintendent.

The Bureau of Mines of the United States Department of the Interior has just issued a 300-page bulletin on the subject of Brass-Furnace Practice in the United States, by H. W. Gillett. Metal men desiring this book should ask for Bulletin No. 73. The bulletin contains much valuable information and is thoroughly indexed. The Bureau of Mines is thus doing some good work in the interest of the metal industry. It has recently added considerable equipment to its experimental station in Denver, Colo., including one of the well-known Dings Magnetic Separators.

R. F. Lang, of 8 and 10 Bridge street, New York, well known in the trade as the pioneer in the introduction of Phosphor Copper in the United States, has returned from his annual trip abroad. Mr. Lang brought with him a full line of samples of brass machine parts and plumbers' brasses produced by a new method by the Royal Works, whom he represents. These brass parts are pressed into the shapes required from solid blocks of brass or bronze, and are far superior to brass castings, not even excluding die castings. It is claimed they afford an immense amount of saving in labor, as they are perfectly smooth and clean-cut and require very little and in many instances no machining at all.

The Cleveland Metal Products Company, Cleveland, Ohio, announces that the large extensions that are being made to its plant will be used for the casting, rolling and fabrication of aluminum. The company at present has a large steel stamping and porcelain enameling plant, the latter being 160 x 252 feet. In addition to this it has a factory building 62 x 170 feet, five stories. An addition 100 x 266 feet is being made to the latter building and this extension will be used for the manufacture of aluminum cooking utensils. A castings building 57 x 83 feet and a rolling mill building 82 x 100 feet are under construction to provide sheets and castings for cooking utensils. In addition to these utensils aluminum sheets and castings will be placed on the market.

The fact that F. B. Stevens, of Detroit, Mich., has furnished a complete equipment of cupolas and brass furnaces for an experimental foundry to the Elyria City Board of Education, Elyria, Ohio, causes Mr. Stevens to remark that the "Schoolmaster is abroad in the land." He says in this connection: "A manual training school combines the essentials of practice with theoretical teaching and so impresses the youthful mind that his future career is influenced by his early experience. The printed description or the theoretical instruction, sometimes enhanced by a picture, in the training school takes real shape in the youthful mind when in contact with the tangible thing or with real practice. Just as a toy interests the child more than its picture, so the

training school will make its indelible impression on the mind of the youth and helps to build men."

The Davidson-Lewis Metal Products Company, Architects Building, New York, has been incorporated to carry on the metal business in all its branches, comprising brass, copper, bronze, German silver phosphor-yellow metal, naval bronze, manganese bronze, brass and copper tubing and fittings, brass and copper wire cloth, perforated brass and copper; in fact, everything in the brass and copper line. The president of the company is George Davidson, formerly of the U. T. Hungerford Brass & Copper Company. Robert P. Lewis, formerly of the Blake & Johnson Company, Waterbury, Conn., is secretary and treasurer. They announce that they have organized a staff of experts who thoroughly understand the requirements of metal users and with their mill facilities are able to guarantee quality, service and price. Order for stock sizes will be shipped from their New York warehouses the same day order is received.

## PROFIT-SHARING PLAN AT CLEVELAND

The W. S. Tyler Company, Cleveland, Ohio, maker of wire cloth and brass work and other metal products, has adopted a profit-sharing plan which will become effective January 1, 1915, but will apply to earnings of the company during 1914. After 6 per cent. interest on capital stock has been deducted, cash dividends will be paid to men employed three years or more on the same percentage as to stockholders, based on the total amount of wages paid each employee during the year. Employees who have been in the company between two and three years will receive dividends based on their year's wages at two-thirds the rate paid older employees, and employees who have served between six months and two years will receive one-third of the cash dividend rate. Should employees be laid off through lack of work they will be entitld to their share of the cash dividends based on wages received by them during the year.

## HUNGERFORD BUILDING

The sixteen-story loft building being erected by U. T. Hungerford Brass & Copper Company, New York, is fast approaching completion and will be ready for occupancy about November 1, 1914. The Hungerford Building is situated at 76-78 Lafayette street, 42-46 Franklin street and 87-95 White street, facing the new Civic Centre. The location is central, accessible and in the heart of commerce and transit. The building is absolutely fireproof and represents a notable achievement in buildings of this type, embodying the last word in up-to-date construction and conveniences. The rapid growth of this well-known company and their constantly expanding business, necessitated the erection of a building especially adapted to accommodate their enormous stock of metal, aggregating five million pounds of brass and copper in various forms.

A six-story building at 83-85 White street, adjoining the Hungerford Building, has been purchased by this company and completely remodelled to be used as a warehouse for their surplus stock. The Hungerford Company will go into their new quarters accompanied by the well wishes of its many friends in the trade throughout the country.

## REMOVALS

The B. Mercil & Sons Plating Company, formerly located at 162 North Clinton street, Chicago, Ill., have removed their plating plant to 1911 Fulton street, Chicago, Ill.

E. L. Eckenrode, of Chicago, Ill., has moved to Omaha, Neb., where he has started the Acme Plating & Galvanizing Company at 1710 Jackson street. He will do all kinds of gold, silver and nickel plating and electro-galvanizing.

The E. J. Woodison Company, manufacturers of foundry and platers' and polishers' supplies, Detroit, Mich., have found that the proposed location at 378 Ellicott Square Building, Buffalo, N. Y., noted in THE METAL INDUSTRY for July, is not suitable enough or, not well enough adapted for use as an office and, therefore, have installed a very up-to-date office and warehouse in connection therewith in the Thomas Power Building, 1200 Niagara street, Buffalo, N. Y.

The Eureka Pneumatic Spray Company have moved from 276 Spring street to new and larger quarters at 62 and 64 Ninth avenue, corner Fifteenth street, New York. In their new location, the company will be better equipped than ever to handle their large business in sprayers and accessories for applying lacquers, enamels, japans, etc. The new location is especially convenient for both out of town and local customers, as it can be reached easily by the Ninth avenue elevated road, or the Fourteenth street crosstown and other car lines.

## CHANGE OF FIRM NAME

The plating supply business heretofore operated under the name of E. Reed Burns, 40 and 42 Withers street, Brooklyn, N. Y., will hereafter be known as the E. Reed Burns Supply Company. This is a change in name only, the personnel and policy of the house remaining the same as before.

## INCORPORATIONS

**Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.**

**To manufacture metal products**—Climax Metal Products Company, New York, N. Y. Capital, $5,000. Incorporators: A. T. Rutter, F. E. Bartlett and H. C. Carpenter.

**To manufacture jewelry and metal products**—The Sturtevant-Whiting Company, North Attleboro, Mass. Incorporators: Louis Kurtz, president; Fred B. Brigham, vice-president, and George A. Whiting, treasurer. The corporation took over the business of the Sturtevant & Whiting Company on July 1.

## PRINTED MATTER

**Metal Hinges.**—The C. J. Root Company, Bristol, Conn., have issued a thirty-two page illustrated catalog, giving description of their extensive line of hinges and metal stampings made up of wrought brass and finished in any of the standard finishes such as black lacquer, copper oxidized, antique brass, dull brass, mission, etc. Copies of the catalog may be had upon request.

**Sand Blast.**—The Carter Metal Cleaning Company, Philadelphia, Pa., have issued a booklet giving complete description and illustration of the Evans high pressure sand blast (patented). This sand blast machine is made in various sizes, ranging from 300 to 2,000 pounds capacity. The mechanical construction is the same in all sizes. For further information the reader is advised to correspond with the above mentioned company and get a copy of the booklet.

**Angular Grit.**—The Pittsburgh Crushed Steel Company, Pittsburgh, Pa., give some very good reasons why sand blast users should use Angular Grit in a little circular just issued. Some of these reasons include the fact that the grit is angular and irregular, thus having many cutting points in comparison with shot, which is a round material and has no cutting edges. Angular Grit does not pulverize or break down like sand and cleans quicker and better, leaving a clean surface. Angular Grit does away with dust, sand storage bins and sand dryers, as it can be used over and over again; it cleans quicker, more satisfactorily and more economically. Prices and samples of this grit will be sent upon application.

## CATALOG EXHIBIT

**An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.**

## METAL MARKET REVIEW

NEW YORK, August 10, 1914.

### COPPER.

The advance in copper during the early days of July was engineered from America through the medium of the London Standard market. Buying orders from here were sent to London and prices there advanced. Consumers here took hold freely and prices were pushed up from around 13¼-⅜ to 13⅞. On the publication of the Copper Producers' Association figures, showing an increase in stocks of 21,768,022 pounds, the buying movement collapsed, and from the 10th of July prices began to decline in the open market, while producers held for some days longer to the high figure they had been able to push the market to on the successfully engineered coup.

The market has since been very dull, and prices at the end of the month were just about 1 cent per pound below the high prices ruling up to July 8.

It is reported some of the producers sold enough copper in the first few days of July to last them for the balance of the month.

The exports for the month were quite heavy, 34,145 tons, against 29,596 tons the same month a year ago.

With the start of war in Europe and the consequent cessation of exports, this market will be in a bad way. It is understood producers have already taken steps to curtail the output.

The London Metal Exchange closed on Friday, July 31, and the New York Metal Exchange also closed.

Trading is at a standstill, but with the continuance of the war it is more than probable that the cartridge makers may be doing a rushing business.

Prices are more or less nominal and buying is very tight.

Lake is quotable at 13 cents, electrolytic 12.75 and casting brands at 12⅝ cents.

### TIN.

The tin market for July was quite active and prices fluctuated about 4 cents per pound. Opening at about 31.20 prices reached 34 cents, the highest point of the month.

The consumption for the month was fairly good, 3,900 tons. With the closing of the London Metal Exchange on Friday, July 31, the board of managers closed the New York Metal Exchange, and all public trading was stopped.

The outside market has been very excited and prices have been very irregular. On Friday the market was quotable at 33 to 34 cents; on Saturday sales were made up to 42 cents per pound; on Monday, August 3, tin sold up to 50 cents per pound; August 4, sales were made at 58 cents and August 6, 62 cents. What is going to happen to the market during the balance of the month, no one can tell.

We started the month with a stock of tin of 1,297 tons, and a stock afloat of 2,115 tons—possibly 1,000 tons of this may get here this month, and with the London Exchange closed no prices have been received from abroad.

### LEAD.

The trust price is pegged at 3.90 New York for 50-ton lots, and independents are meeting this price on carload lots. The market is very dull. St. Louis is quotable at 3.72½.

### SPELTER.

Market is fairly firm at about the same as a month ago, 5.00 to 5.10 New York, and 4.80 to 4.85 East St. Louis.

### ALUMINUM.

The foreign producers have withdrawn all offers, and the market is firmer, with prices inclined to be higher. Market is quotable today at 18 to 19 cents per pound and likely to be higher.

### ANTIMONY.

The market was very dull, and prices were more or less easy during July, but with the war on, prices have advanced rapidly and much higher prices may prevail. Cookson's is quotable today at 7.75 to 8 cents, Hallett's 7.25 to 7.50, and Hungarian grade 6.25 to 6.50.

Later prices have just about doubled, Cookson's on August 7 was 12 to 14 cents, Hallett's 12 and Hungarian grade 11 cents. Market is very excited and much higher prices are likely.

### SILVER.

The silver market has been more or less weak, and prices have been much lower, having declined from 56¾ cents at the opening to 52¼ cents at the close. The London market has been closed for some days. The last price from that center was 22¾d. on Thursday last, July 30. No New York prices.

### PLATINUM.

All foreign quotations have been withdrawn, and prices here are entirely nominal. Soft refined is quotable at $43 to $44, hard 10 per cent. at $46 to $47.50, hard 20 per cent. at $49 to $51.50.

### QUICKSILVER.

During July the wholesale price of quicksilver was reduced $1 to $35 per flask; with the trouble abroad the Rothschilds have withdrawn all prices. Stocks here have been pretty well consumed. Prices are entirely nominal.

### SHEET METALS.

Sheet copper has been reduced to 18.50 cents base; copper wire is quotable at 14 to 14.25 cents base. Brass prices have been reduced from ½ to ⅜ cents per pound.

### OLD METALS.

Market has been weak and unsettled, owing to the decline in copper; with the closing of all quotations abroad the market for all kinds of copper scrap is more or less unsettled. Market is dull and lifeless.—J. J. A.

## JULY MOVEMENTS IN METALS

| | Highest. | Lowest. | Average. |
|---|---|---|---|
| COPPER. | | | |
| Lake | 14.50 | 13.00 | 13.75 |
| Electrolytic | 13⅞ | 12.75 | 13.50 |
| Casting | 13.75 | 12.65 | 13.40 |
| TIN | 34.00 | 30.35 | 31.80 |
| LEAD | 3.90 | 3.90 | 3.90 |
| SPELTER | 5.20 | 5.00 | 5.10 |
| ANTIMONY (Hallett's) | 7.00 | 6.70 | 6.80 |
| SILVER | 56¾ | 52¼ | 54.70 |

## WATERBURY AVERAGE

The average price of Lake Copper per pound as determined monthly at Waterbury, Conn.

1912—Average for year, 16.70. 1913—Average for year, 15.83. 1914—January, 14.75; February, 15.125; March, 15.00; April, 14.875; May, 14.75; June, 14.375; July, 14.12½.

## COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

| | | July 8, 1914. Pounds. |
|---|---|---|
| Stocks of marketable copper of all kinds on hand at all points in the United States, June 1, 1914 | | 84,342,641 |
| Production of marketable copper in the United States from all domestic and foreign sources, during June, 1914 | | 141,345,571 |
| | | 225,688,212 |
| Deliveries: | | |
| For domestic consumption | 46,227,353 | |
| For export | 73,350,196 | |
| | | 119,577,549 |
| Stocks of marketable copper of all kinds on hand at all points in the United States July 1, 1914 | | 106,110,663 |
| Stocks increased during the month of June | | 21,768,022 |

The Copper Producers' Association have decided, on account of the unsettled state of the copper market, not to issue any statement of the stocks of copper for the month of July.

## DAILY METAL PRICES

**We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.**

# Metal Prices, August 10, 1914

## METAL PRICES.

| | Price per lb. Cents. |
|---|---|
| **COPPER—PIG AND INGOT AND OLD COPPER.** Duty Free. Manufactured 5 per centum. | |
| Lake, carload lots, nominal | 13.00 |
| Electrolytic, carload lots | 12.75 |
| Castings, carload lots | 12.50 |
| **TIN—Duty Free.** | |
| Straits of Malacca, carload lots | 60.00 |
| **LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%.** Pig lead, carload lots | 3.90 |
| **SPELTER—Duty 15%. Sheets, 15%.** | |
| Western, carload lots | 5.05 |
| **ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.** | |
| Small lots, f. o. b. factory | 25.00 |
| 100 lb. lots, f. o. b. factory | 23.00 |
| Ton lots, f. o. b. factory | 19.00 |
| **ANTIMONY—Duty free.** | |
| Cookson's cask lots, nominal | 8.00 |
| Hallett's cask lots | 7.50 |
| Hungarian grade | 6.50 |
| **NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad. valorem.** | |
| Shot, Plaquettes, Ingots. Blocks according to quantity | .38 to .43 |
| **ELECTROLYTIC—3 cents per pound extra.** | |
| MANGANESE METAL | .65 |
| **MAGNESIUM METAL.—Duty 25% ad valorem (100 lb. lots)** | 1.50 |
| BISMUTH—Duty free | 2.25 |
| CADMIUM—Duty free | 1.25 |
| CHROMIUM METAL—Duty free | .75 |
| COBALT—97% pure | 2.00 |
| QUICKSILVER—Duty 10% | Nominal |
| | Price per oz. |
| GOLD—Duty free | $20.67 |
| PLATINUM—Duty free | Nominal |
| SILVER—Government assay bars—Duty free | Nominal |

## INGOT METALS.

| | Price per lb. Cents. |
|---|---|
| Silicon Copper, 10% ..... according to quantity | 25 to 28 |
| Silicon Copper, 20% ..... " " | 28 to 32 |
| Silicon Copper, 30% guaranteed " " | 30 to 34 |
| Phosphor Copper, guaranteed 15% " | 22 to 26 |
| Phosphor Copper, guaranteed 10% " | 23 to 28 |
| Manganese Copper, 25% ..... " " | 25 to 29 |
| Phosphor Tin, guaranteed 5%. " " | 57 to 60 |
| Phosphor Tin, no guarantee.. " " | 36 to 38 |
| Brass Ingot, Yellow ..... " " | 10 to 10½ |
| Brass Ingot, Red ..... " " | 12 to 13½ |
| Bronze Ingot ..... " " | 12½ to 13¼ |
| Manganese Bronze Ingots.... " " | 16 to 16½ |
| Phosphor Bronze ..... " " | 18 to 20 |
| Casting Aluminum Alloys.... " " | 16 to 18 |
| PHOSPHORUS—Duty free. According to quantity | 30 to 35 |

## OLD METALS.

| Dealers' Buying Prices. Cents per lb. | | Dealers' Selling Prices. Cents per lb. |
|---|---|---|
| 11.75 to 12.00 | Heavy Cut Copper | 13.00 to 13.25 |
| 11.50 to 11.75 | Copper Wire | 12.50 to 12.75 |
| 10.50 to 10.75 | Light Copper | 11.75 to 12.00 |
| 10.00 to 10.25 | Heavy Mach. Comp | 11.50 to 12.00 |
| 7.25 to 7.50 | Heavy Brass | 8.75 to 9.00 |
| 6.00 to 6.25 | Light Brass | 7.50 to 7.75 |
| 8.75 to 9.00 | No. 1 Yellow Brass Turnings | 8.50 to 8.75 |
| 9.00 to 9.25 | No. 1 Comp. Turnings | 10.00 to 10.50 |
| 3.40 to —— | Heavy Lead | —— to 3.70 |
| 3.50 to —— | Zinc Scrap | 3.75 to 3.875 |
| 5.50 to 6.50 | Scrap Aluminum Turnings | 6.00 to 7.00 |
| 11.50 to 12.00 | Scrap Aluminum, cast alloyed | 12.00 to 13.00 |
| 13.00 to 14.00 | Scrap Aluminum, sheet (new) | 13.00 to 14.00 |
| 23.00 to 24.00 | No. 1 Pewter | 25.00 to 26.00 |
| 20.00 to 23.00 | Old Nickel | 20.00 to 23.00 |

NOTE.—The above prices for ingot and old metals held for July, but at present no quotations are obtainable.

## PRICES OF SHEET COPPER.

BASE PRICE, 18½ Cents per Lb. Net.

| SIZE OF SHEETS. Width. | LENGTH. | 64 oz. and over. | 32 oz. to 64 oz. | 24 oz. up to 32 oz. | 16 oz. up to 24 oz. | 15 oz. | 14 oz. | 13 oz. | 12 oz. | 11 oz. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Extras in Cents per Pound for Sizes and Weights Other than Base. | | | | | | | | |
| Not wider than 30 ins. | Not longer than 72 inches. | Base | Base | Base | Base | ½ | 1 | 1½ | 2 | 2½ |
| | Longer than 72 inches. Not longer than 96 inches. | " | " | " | " | ½ | 1 | 2 | 3 | 4½ |
| | Longer than 96 inches. Not longer than 120 inches. | " | " | ½ | 1 | 2 | 3 | 5 | 7 | |
| | Longer than 120 ins. | " | " | 1 | 1½ | | | | | |
| Wider than 30 ins. but not wider than 36 inches. | Not longer than 72 inches. | " | " | Base | Base | 1 | 2 | 3 | 4 | 6 |
| | Longer than 72 inches. Not longer than 96 inches. | " | " | " | " | 1 | 2 | 4 | 6 | 8 |
| | Longer than 96 inches. Not longer than 120 inches. | " | " | 1 | 2 | 3 | 4 | | | |
| | Longer than 120 inches. | " | 1 | 2 | 3 | | | | | |
| Wider than 36 ins. but not wider than 48 inches. | Not longer than 72 inches. | " | Base | 1 | 2 | 3 | 4 | 6 | 8 | 9 |
| | Longer than 72 inches. Not longer than 96 inches. | " | " | 1 | 3 | 4 | 5 | 7 | 9 | |
| | Longer than 96 inches. Not longer than 120 inches. | " | " | 2 | 4 | 6 | 9 | | | |
| | Longer than 120 inches. | " | 1 | 3 | 6 | | | | | |
| Wider than 48 ins. but not wider than 60 inches. | Not longer than 72 inches. | " | Base | 1 | 3 | 5 | 7 | 9 | 11 | |
| | Longer than 72 inches. Not longer than 96 inches. | " | " | 2 | 4 | 7 | 10 | | | |
| | Longer than 96 inches. Not longer than 120 inches. | " | 1 | 3 | 6 | | | | | |
| | Longer than 120 inches. | 1 | 2 | 4 | 8 | | | | | |
| Wider than 60 ins. but not wider than 72 ins. | Not longer than 96 inches. | Base | 1 | 3 | 8 | | | | | |
| | Longer than 96 inches. Not longer than 120 inches. | " | 2 | 5 | 10 | | | | | |
| | Longer than 120 inches. | 1 | 3 | 8 | | | | | | |
| Wider than 72 ins. but not wider than 108 ins. | Not longer than 96 inches. | 1 | 3 | 6 | | | | | | |
| | Longer than 96 inches. Not longer than 120 inches. | 2 | 4 | 7 | | | | | | |
| | Longer than 120 inches. | 3 | 5 | 9 | | | | | | |
| Wider than 108 ins., but not wider than 120 ins. | Not longer than 120 inches. | 4 | 6 | | | | | | | |

The longest dimension in any sheet shall be considered at its length.

**CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS,** advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

**CIRCLES LESS THAN 8 IN. DIAMETER,** advance per pound over prices of Sheet Copper required to cut them from ..... 6c.

**COLD OR HARD ROLLED COPPER,** 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

**COLD OR HARD ROLLED COPPER,** lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

**COLD ROLLED ANNEALED COPPER,** the same price as Cold Rolled Copper.

**ALL POLISHED COPPER,** 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

**ALL POLISHED COPPER,** over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

**COLD ROLLER COPPER,** prepared suitable for polishing, same prices and extras as Polished Copper.

**ALL PLANISHED COPPER,** advance per square foot over the prices for Polished Copper ..... 1c.

**ZINC—** Duty, sheet, 15%. Cents per lb.

Carload lots, standard sizes and gauges, at mill .....7.00 basis, less 8%

Casks, jobbers' prices ..... 7⅞c.

Open casks, jobbers' prices ..... 8¼c.

# Metal Prices, August 10, 1914

## PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

**In effect August 1, 1914, and until further notice.**

To customers who buy over 5,000 lbs. per year.

| | Net base per lb. High Brass. | Low Brass. | Bronze. |
|---|---|---|---|
| Sheet | $0.13½ | $0.15¼ | $0.16½ |
| Wire | .13¼ | .15¼ | .16½ |
| Rod | .13¼ | .16 | .17½ |
| Brazed tubing | .18 | — | .21⅜ |
| Open seam tubing | .18 | — | .21⅜ |
| Angles and channels, plain | .18 | — | .21⅜ |

50% discount from all extras as shown in Brass Manufacturers' Price List.

**NET EXTRAS FOR QUALITY.**

| | | |
|---|---|---|
| Sheet—Extra spring, drawing and spinning brass | ½c. | per lb. net advance |
| " —Best spring, drawing and spinning brass | 1½c. | " " " |
| Wire—Extra spring and brazing wire | ½c. | " " " |
| " —Best spring and brazing wire | 1c. | " " " |

To customers who buy 5,000 lbs. or less per year.

| | Net base per lb. High Brass. | Low Brass. | Bronze. |
|---|---|---|---|
| Sheet | $0.14¾ | $0.16½ | $0.17¾ |
| Wire | .14½ | .16½ | .17¾ |
| Rod | .14½ | .17¼ | .18¾ |
| Brass tubing | .19¼ | — | .22½ |
| Open seam tubing | .19¼ | — | .22½ |
| Angles and channels, plain | .19¼ | — | .22½ |

Net extra as shown in Brass Manufacturers' Price List.

**NET EXTRAS FOR QUALITY.**

| | | |
|---|---|---|
| Sheet—Extra spring, drawing and spinning brass | ½c. | per lb. net advance |
| " —Best spring, drawing and spinning brass | 1½c. | " " " |
| Wire—Extra spring and brazing wire | ½c. | " " " |
| " —Best spring and brazing wire | 1c. | " " " |

## BARE COPPER WIRE—CARLOAD LOTS.

14½c. per lb. base.

## SOLDERING COPPERS.

| | |
|---|---|
| 300 lbs. and over in one order | 19½c. per lb. base |
| 100 lbs. to 300 lbs. in one order | 20c. " " " |
| Less than 100 lbs. in one order | 21½c. " " " |

## PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 16c. per lb.
Seamless Copper Tubing, 19½c. per lb.

**For other sizes see Manufacturers' List.**

## PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

| ⅛ | ¼ | ⅜ | ½ | ¾ | 1 | 1¼ | 1½ | 2 | 2½ | 3 | 3½ | 4 | 4½ | 5 | 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | 23 | 18 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 18 | 20 | 22 | 23 |

## PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

| | Per 100 feet Brass. | Bronze. |
|---|---|---|
| ⅜ inch | $8 | $9 |
| ½ inch | 8 | 9 |
| ⅝ inch | 10 | 11 |
| ¾ inch | 12 | 13 |
| ⅞ inch | 14 | 15 |
| 1 inch | 18 | 20 |
| 1¼ inch | 22 | 24 |
| 1¼ inch | 25 | 27 |
| 1½ inch | 32 | 35 |
| 1¾ inch | 45 | 48 |
| 2 inch | 56 | 69 |

Discount 55-5%.

## PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

| | | |
|---|---|---|
| Tobin Bronze Rod | 17½c. | net base |
| Muntz or Yellow Metal Sheathing (14" x 48") | 14c. | " " |
| " " " " Rectangular sheets other than Sheathing | 16½c. | " " |
| " " " " Rod | 14c. | " " |

Above are for 100 lbs. or more in one order.

## PLATERS' METALS.

Platers' bar in the rough, 23c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

## PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 4c. over Pig Tin. 50 to 100 lbs. 5c. over, 25 to 50 lbs. 7c. over, less 25 lbs. 9c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

## PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

| Gauge. | Width. Inches. | 1 ton. | 500 lbs. | 50 lbs. | Less than 50 lbs. |
|---|---|---|---|---|---|
| 20 and heavier | 3-30 | 30c. | 34c. | 36c. | 38c. |
| 21 to 24 inclusive | 3-30 | 32c. | 35c. | 37c. | 39c. |
| | 48-60 | 39c. | 40c. | 42c. | 44c. |
| 25 to 26 | 3-30 | 33c. | 36c. | 38c. | 40c. |
| | 30-48 | 35c. | 38c. | 40c. | 42c. |
| 27 | 3-30 | 36c. | 37c. | 39c. | 41c. |
| | 30-48 | 39c. | 40c. | 42c. | 44c. |
| 28 | 3-30 | 37c. | 38c. | 40c. | 42c. |
| | 30-48 | 40c. | 41c. | 43c. | 45c. |
| 29 | 3-30 | 38c. | 39c. | 41c. | 43c. |
| | 30-48 | 42c. | 43c. | 45c. | 47c. |
| 30 | 3-30 | 39c. | 40c. | 42c. | 44c. |

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. No charge for boxing. F. O. B. Mill.

## PRICE LIST SEAMLESS ALUMINUM TUBING.

**STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.**
Outside Diameters. **BASE PRICE, 24 Cents per Pound.**

| Stubs' Gauge. | Inches. | ¼ in. | 5-16 in. | ⅜ in. | ½ in. | ⅝ in. | ¾ in. | ⅞ in. | 1 in. | 1¼ in. | 1½ in. | 1¾ in. | 2 in. | 2½ ins. | 3 ins. | 3½ ins. | 4 ins. | 4½ ins. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11. | .120. | .. | .. | .. | .. | .. | .. | .. | 26 | 23 | .. | .. | 13 | 19 | 9 | 8 | 15 | 22 |
| 12. | .109. | .. | .. | .. | .. | .. | .. | .. | 25 | .. | .. | .. | 14 | .. | .. | .. | .. | .. |
| 14. | .083. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 16 | .. | .. | .. | .. | .. |
| 16. | .065. | .. | .. | .. | .. | .. | 27 | 26 | 26 | 23 | 22 | 20 | 20 | 20 | 20 | 26 | 30 | 36 |
| 18. | .049. | .. | .. | .. | .. | 32 | 29 | 28 | 27 | 24 | 25 | 25 | 25 | .. | .. | .. | .. | .. |
| 20. | .035. | 116 | .. | 45 | 38 | 33 | 32 | 31 | 29 | 28 | 29 | 29 | 29 | 30 | 37 | 48 | 57 | 80 |
| 21. | .032. | .. | .. | .. | 39 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 22. | .028. | 137 | 97 | 47 | 41 | 37 | 36 | 34 | 33 | .. | .. | 44 | .. | .. | .. | .. | .. | .. |
| 24. | .022. | 187 | 132 | 107 | 87 | 78 | 72 | 61 | 59 | 65 | .. | .. | .. | .. | .. | .. | .. | .. |

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

## PRICE LIST FOR ALUMINUM ROD AND WIRE.

| Diameter. B. & S. G'ge | 000 to No. | No. 10. | No. 11. | No. 12. | No. 13. | No. 14. | No. 15. | No. 16. | No. 17. | No. 18. | No. 19. | No. 20. | No. 21. | No. 22. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Price per lb. | 33 | 33½ | 33½ | 34 | 34½ | 35 | 35½ | 36 | 37 | 38 | 39 | 44 | 47 | |

## BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

| Quality. | Net per lb. | Quality. | Net per lb. |
|---|---|---|---|
| 5% | 18¼c. | 16% | 22¾c. |
| 8% | 20c. | 18% | 23¼c. |
| 10% | 20½c. | 20% | 25½c. |
| 12% | 21½c. | 25% | 33¾c. |
| 15% | 22½c. | 30% | 39¾c. |

## GERMAN SILVER WIRE.

| Quality. | Net per lb. | Quality. | Net per lb. |
|---|---|---|---|
| 5% | 19¼c. | 15% | 26½c. |
| 8% | 21c. | 16% | 27½c. |
| 10% | 22½c. | 18% | 29¼c. |
| 12% | 24½c. | 30% | 45¼c. |

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

## PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.